

**Fishery Data Series No. 97-8**

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# **Summary of Escapement Index Counts of Chinook Salmon in the Northern Cook Inlet Management Area, 1958-1996**

by

**Robert Lafferty**

March 1997

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Alaska Department of Fish and Game

Division of Sport Fish



## Symbols and Abbreviations

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Weights and measures (metric)		General		Mathematics, statistics, fisheries	
centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	$H_A$
deciliter	dL			base of natural logarithm	e
gram	g	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	catch per unit effort	CPUE
hectare	ha	and	&	coefficient of variation	CV
kilogram	kg	at	@	common test statistics	F, t, $\chi^2$ , etc.
kilometer	km	Compass directions:		confidence interval	C.I.
liter	L			correlation coefficient	R (multiple)
meter	m	east	E	correlation coefficient	r (simple)
metric ton	mt	north	N	covariance	cov
milliliter	ml	south	S	degree (angular or temperature)	°
millimeter	mm	west	W	degrees of freedom	df
		Copyright	©	divided by	÷ or / (in equations)
		Corporate suffixes:		equals	=
		Company	Co.	expected value	E
		Corporation	Corp.	fork length	FL
		Incorporated	Inc.	greater than	>
		Limited	Ltd.	greater than or equal to	≥
		et alii (and other people)	et al.	harvest per unit effort	HPUE
		et cetera (and so forth)	etc.	less than	<
		exempli gratia (for example)	e.g.,	less than or equal to	≤
		id est (that is)	i.e.,	logarithm (natural)	ln
		latitude or longitude	lat. or long.	logarithm (base 10)	log
		monetary symbols (U.S.)	\$, ¢	logarithm (specify base)	log <sub>2</sub> , etc.
		months (tables and figures): first three letters	Jan,...,Dec	mid-eye-to-fork	MEF
		number (before a number)	# (e.g., #10)	minute (angular)	'
		pounds (after a number)	# (e.g., 10#)	multiplied by	x
		registered trademark	®	not significant	NS
		trademark	™	null hypothesis	$H_0$
		United States (adjective)	U.S.	percent	%
		United States of America (noun)	USA	probability	P
		U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
				probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
				second (angular)	"
				standard deviation	SD
				standard error	SE
				standard length	SL
				total length	TL
				variance	Var
<b>Weights and measures (English)</b>					
cubic feet per second	ft <sup>3</sup> /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
Spell out acre and ton.					
<b>Time and temperature</b>					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
hour (spell out for 24-hour clock)	h				
minute	min				
second	s				
Spell out year, month, and week.					
<b>Physics and chemistry</b>					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

***FISHERY DATA SERIES NO. 97-8***

**SUMMARY OF ESCAPEMENT INDEX COUNTS OF CHINOOK  
SALMON IN THE NORTHERN COOK INLET MANAGEMENT AREA,  
1958-1996**

by  
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## ABSTRACT

Escapement index counts of chinook salmon *Oncorhynchus tshawytscha* have been conducted in streams of Northern Cook Inlet Management Area since 1958. Spawning chinook salmon have been counted from both helicopters and fixed-wing aircraft. Eighty-eight streams have been documented to contain spawning chinook salmon in the Northern Cook Inlet Management Area. Aerial escapement index counts are conducted on 17 streams on an annual basis (1977-1996), and it is believed that 50% to 60% of the chinook salmon production of Northern Cook Inlet returns to these 17 streams. Escapement counts from weirs were compared to escapement index counts; index counts averaged 46% agreement with weir counts. Four years of paired escapement index counts from three observers had 93% agreement.

Key words: Chinook salmon, *Oncorhynchus tshawytscha*, escapement survey, escapement index counts, aerial survey, aircraft, helicopter, weirs.

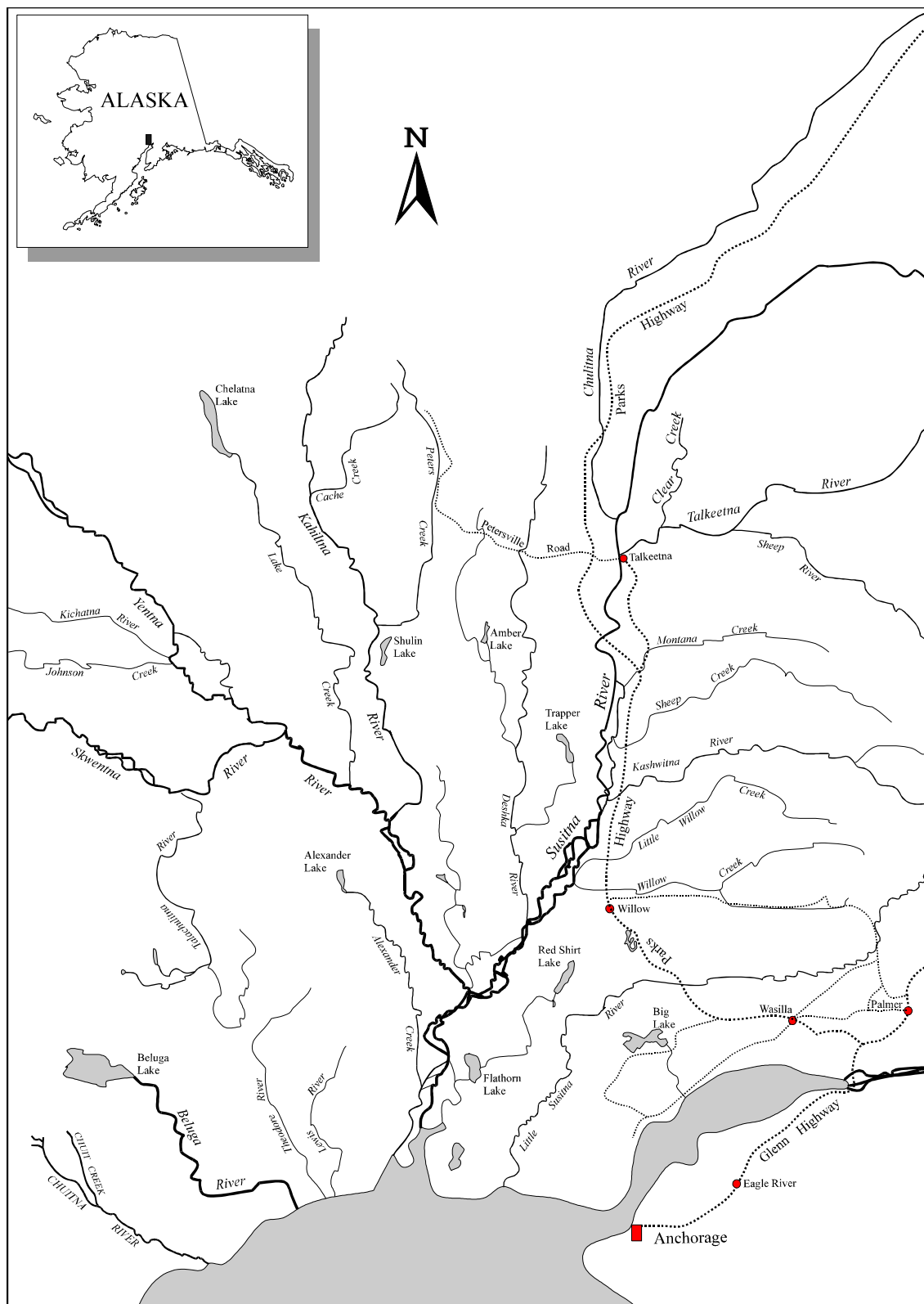
## INTRODUCTION

Escapement index counts of chinook salmon *Oncorhynchus tshawytscha* have been conducted in numerous streams of the Northern Cook Inlet Management Area (NCIMA) since 1958. The NCIMA covers a large expanse of Southcentral Alaska (Figure 1). This sport fishery management area covers approximately 23,000 square miles and is dominated by the Susitna River drainage. The Susitna River originates in glaciers of the Alaska and Talkeetna mountain ranges and flows south about 200 miles into Cook Inlet. The NCIMA is partitioned into four sport fishery management units consisting of the following drainages and landmarks:

1. Knik Arm Unit-includes all waters of the Matanuska, Knik, and Little Susitna river drainages with the exception of those waters south and west of the Eklutna River;
2. Eastside Susitna Unit-includes all drainages of the upper Susitna River upstream of the Chulitna River beyond the confluence the Oshetna River and all eastside tributaries of the Chulitna and Susitna rivers;
3. Westside Susitna Unit-includes all westside tributaries of Chulitna and Susitna rivers; and
4. West Cook Inlet Unit-includes all freshwater drainages entering Cook Inlet between the Susitna River and the West Foreland.

Approximately 50% of the state's human population resides in or is adjacent to the NCIMA. The fishery resources of this area come under intensive allocative discussions during the Alaska Board of Fisheries process. Allocative conflicts have led the Board of Fisheries to develop several management plans and policies to manage NCIMA fisheries (Whitmore et al. 1995). A historical perspective of the NCIMA chinook salmon fishery can be located in the area management reports of Whitmore et al. (1994 and 1995) and reports to the Board of Fisheries by Delaney and Vincent-Lang (*Unpublished*) and Lafferty (*Unpublished*). During 1992, the Alaska Department of Fish and Game (ADF&G) adopted a *Salmon Escapement Goal Policy* that incorporated a formal process to create new and continued evaluation of spawning escapement goals (Fried 1994).

This report documents the complete post-statehood history of escapement index counts of chinook salmon in the NCIMA and is intended to supplement the established spawning escapement goals. Escapement index counts of chinook salmon in NCIMA have been published in a myriad of documents. Escapement index counts can be found in Fishery Data Series



**Figure 1.-Northern Cook Inlet Management Area.**



publications, area management reports, stream files, and memorandum files. The largest component of NCIMA chinook salmon count information is located in the stream files of the ADF&G office in Palmer. Escapement index counts from these stream files were entered into an Excel database for summarizing in this report.

There have been many custodians of the escapement index counts for chinook salmon in streams of Northern Cook Inlet. Prior to statehood, the U. S. Fish and Wildlife Service conducted aerial counts of chinook salmon in Northern Cook Inlet waters. Staff from the Anchorage office of the Sport Fish Division of ADF&G conducted aerial counts from 1960 to 1973. In 1973, the Alaska legislature appropriated \$50,000 to ADF&G to document primary chinook salmon spawning streams in Northern Cook Inlet. Management responsibilities for sport fisheries of NCIMA were split between the Anchorage and Palmer offices in 1974. The westside Susitna River and West Cook Inlet management units remained with the Anchorage staff while management of sport fisheries of the eastside Susitna River tributaries and waters of Knik Arm were delegated to the Palmer staff. In addition to escapement index counts being conducted by Sport Fish staff, the Susitna River hydroelectric program initiated additional surveys from 1981 through 1984. Most of these surveys were designed to document the presence of salmonids in areas that might have been affected by the proposed dam in the Susitna River. Sport fishery management units of the West Cook Inlet and westside Susitna River tributaries were reassigned to the area management biologist stationed in the Palmer office in 1989.

During 1976 there were two significant factors that affected chinook salmon in NCIMA, the Magnuson Act and development of a comprehensive survey program to index chinook salmon escapement. The increase of chinook salmon into the NCIMA can be attributed to the Magnuson Fishery Conservation and Management Act. This act, sometimes known as the 200-mile limit law, extended federal management authority into waters from 3 to 200 miles from the United States coast. The effects of this law on Cook Inlet chinook salmon are not fully understood, however, it is believed that this law dramatically reduced the interception of chinook salmon in the high seas fisheries in the North Pacific Ocean that occurred prior to the mid 1970s. Additionally, during 1976, area biologists constructed a survey program that included 17 streams in NCIMA. This survey program remains the sole tool to assess chinook salmon escapements into Northern Cook Inlet tributaries. The use of weirs to count escapement and verify aerial surveys has been helpful in recent years in furthering our understanding of the limitations of the aerial survey program in NCIMA.

## **METHODS**

### **ESCAPEMENT INDEX COUNTS**

Escapement index counts of spawning chinook salmon have been conducted to estimate escapement throughout Alaska. In most cases, conducting surveys from fixed-wing aircraft is the most economical method. However, fixed-wing aircraft are not very maneuverable and have limited visibility when the pilot is trying to follow a meandering stream. From 1958 through 1973, most escapement index counts were conducted from fixed-wing aircraft.

Because of slower air speeds and maneuverability on meandering streams, helicopters are preferred over fixed-wing aircraft when counts are of short duration or refueling is possible within the survey area. In addition, the field of view is considerably larger in a helicopter than

fixed-wing aircraft. A comparison of fixed-wing aircraft to helicopters for conducting escapement index counts was initiated in 1973. Kubik and Trent (1974) compared aerial escapement index counts of spawning chinook salmon in 11 streams in the NCIMA during 1973 from fixed-wing aircraft (PA-18 supercub) to counts from helicopters (Bell 47). Surveys from helicopters consistently produced higher counts of spawning chinook salmon. Helicopters became the aircraft of choice for aerial escapement index counts of spawning chinook salmon in 1974 in NCIMA.

Foot surveys are also used for escapement index counts, but infrequently. Most of the streams in the NCIMA are remote, lengthy, and traverse difficult terrain. Hence, the use of foot surveys has been minimal.

Three major factors affect the quality of aerial escapement index counts: fish behavior, stream characteristics, and weather conditions. Surveys are generally conducted by one trained observer while the pilot is flying the aircraft. If weather and budgets allow, streams are flown several times to obtain counts during peak spawning. However, the dates of peak spawning are variable from year to year. As the peak of spawning approaches, the behavior of chinook salmon changes from schooling aggregations to mating pairs. Physical characteristics of redds dug by chinook salmon are well documented (Groot and Margolis 1991). Most of the redds occur above riffles in the thalweg of the stream channel. The combination of pairing and redd location provide observers with ideal conditions to count chinook salmon.

Many of the watersheds within the NCIMA are influenced by glaciers. Glacial turbidity can vary greatly depending on melt conditions. Glacial streams are broad, shallow, and tend to have multiple channels that meander within the watershed. Depending on the season, some glacial streams can have large silt loads. Several of the streams in the NCIMA remain turbid throughout the open water period; visual estimates cannot be obtained from these systems. However, there are many streams in the NCIMA that originate from bogs, lakes, and springs. Dissolved organic matter from bogs produce stained or tea-colored water conditions. Water visibility ranges between stained to light glacial turbidity (i.e. milky wash) during annual spawning counts of chinook salmon in NCIMA.

Light conditions can affect the observer's ability to see into deep pools and shaded areas of streams. To reduce the effects of shade on the streams, counts are conducted from mid-morning (1000 hours) to mid-afternoon (1500 hours). Observers evaluate the water visibility and lighting conditions during the survey. If visibility decreases during the survey, the observer has the option to continue or repeat the survey at a later date. Mining activity or bank slides may also decrease water visibility for short segments of a spawning survey. Polaroid sunglasses may be helpful in reducing glare from the stream surface.

Escapement index surveys have been conducted consistently over the same length of stream every year since the early 1960s. A detailed listing of the stream sections and the tributaries are reviewed annually. Generally, streams are flown from the confluence with tidal water or a glacial river, upstream to the uppermost reach of the stream. All major clearwater tributaries of each stream are also flown. Observers count both live and dead chinook salmon with a hand tally and make notes regarding weather, visibility, and schooling behavior of fish. When multiple spawning surveys are conducted, the highest count is the one that is reported.

Escapement index counts are used as indices of total escapement. When conditions of counts are consistent from year to year, comparisons among years can be made. Biological escapement goals (BEG) for 17 streams were developed from escapement index counts conducted from 1979 to 1992. BEGs of the NCIMA represent 66% of the average aerial escapement index counts for 11 years (1979, 1982-1988, and 1990-1992). ADF&G biologists of NCIMA felt that escapement index counts from this time period were generally above the level needed to sustain average long-term production.

## **VARIABILITY OF ESCAPEMENT INDEX COUNTS AND COMPARISONS TO WEIR COUNTS**

Evaluation of the variability between observers has not been an objective of escapement index counts in NCIMA. However, during the years 1993, 1994, 1995, and 1996, several streams and rivers had paired counts within a period of 9 days. These counts were conducted by three different observers across the 4 years. Percent agreement for each paired count was calculated by dividing the lowest count of each pair by the highest count of each pair.

In recent years, fish counting weirs have been located in the Little Susitna and Deshka rivers. Both weirs are located below the majority of the chinook salmon spawning grounds in each river. This has provided an opportunity to compare actual counts of escapement obtained from weirs to aerial escapement index counts. Four different biologists participated in the aerial escapement index counts for this comparison. Percent agreement of the index counts and weir counts was calculated by dividing the index count by the weir count.

## **RESULTS**

Eighty-eight streams have been surveyed at least once between 1958 and 1996 in the NCIMA (Appendices A and B). Seventeen streams have been predominantly reported in annual progress reports, area management reports and Fishery Data Series reports (Table 1). In addition, three streams are not reported but are surveyed on an annual basis (Indian and Portage creeks, and the North Fork of the Kashwitna River). There are several entries that include surveys conducted in late June to determine presence of chinook salmon at some popular sport fishing areas. Unfortunately, specific information on the number of fish seen between segments within a survey has not been recorded rigorously. Many of the escapement index counts are a single number with a few comments. Many of the surveys from streams in the upper Susitna and Chulitna rivers from 1981 through 1984 (during the Susitna River hydroelectric program) were not escapement index counts, but were short surveys looking for presence of any salmon during spawning periods.

Due to inclement weather and poor water visibility, escapement index counts were not reported during 1980 and 1981 for all streams in the NCIMA. However some surveys conducted during 1981 are to be considered minimal. During 1989 inclement weather did not allow escapement index surveys to be conducted for most streams of the Westside Susitna River management unit.

Escapement index counts were summarized for 1958-1969, 1970-1979, 1980-1989, and 1990-1996 for 17 streams (Table 1). The highest combined escapement index count occurred in 1977 when 80,513 chinook salmon were counted in these 17 streams. The Deshka River drainage

**Table 1.-Escapement index counts of chinook salmon into streams of the Northern Cook Inlet Management Area, 1958-1996.**

Management Unit/Stream	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1958-1969 Average
<u>Knik Arm Management Unit</u>													
Little Susitna River												200	200
<u>Eastside Susitna Management Unit</u>													
Chulitna River													
Clear Creek													
Goose Creek													
Little Willow Creek	53			112	26	11	7	3	38	6	12	150	42
Montana Creek	43			65	75	23	69	57	100	2	5	200	64
Prairie Creek					142	275	138	30				175	152
Sheep Creek	250	134		70	35	24		4	100			250	108
Willow Creek												290	290
<u>Westside Susitna Management Unit</u>													
Alexander Creek				0	19	750	205	416	300	500	727	735	406
Deshka River	3				998	131	2,422	2,749	933	1,535	4,863	5,652	2,143
Lake Creek				60	10	4	45	172	300	1,000	1,300	1,540	492
Peters Creek					9	5	12	101					32
Talachulitna River	0			32	78	56	95	69	15				49
<u>West Cook Inlet Management Unit</u>													
Chuitna River													
Lewis River													
Theodore River													
NCI Total	349	134		339	1,392	1,279	2,993	3,601	1,786	3,043	6,907	9,192	2,820

-continued-

**Table 1.-Page 2 of 4.**

Management Unit/Stream	1970	1971	1972	1973	1974 <sup>a</sup>	1975 <sup>a</sup>	1976 <sup>a</sup>	1977 <sup>a</sup>	1978 <sup>a</sup>	1979 <sup>a</sup>	1970-1979 Average	BEG <sup>b</sup>
<u>Knik Arm Management Unit</u>												
Little Susitna River	56		30	374			405				216	850
<u>Eastside Susitna Management Unit</u>												
Chulitna River				261	200	62	2,106	2,179	1021		972	2,000
Clear Creek		4	91	292	283	101	1,237	769	997	864	515	1,300
Goose Creek					41	13	160	133	283		126	350
Little Willow Creek	45		99	371	139	103	833	598	436	324	328	650
Montana Creek	282	44	317	511	280	229	1,145	1,443	881	1,094	623	1,100
Prairie Creek	1,640		630	4,190	1,498	369	6,513	5,790	5,154		3,223	4,700
Sheep Creek			101	482	202	42	455	630	1,209	778	487	650
Willow Creek	640	165	370	1,019	402	177	1,747	1,065	1,263	1,085	793	1,750
<u>Westside Susitna Management Unit</u>												
Alexander Creek	562		202	875	2,193	1,878	5,412	9,246	5,854	6,215	3,604	2,700
Deshka River	5,286	161	1,780	2,381	5,279	4,737	21,693	39,642	24,639	27,385	13,298	11,200
Lake Creek	54	119	920	761	535	281	3,735	7,391	8,931	4,196	2,692	2,900
Peters Creek			95		147	13	3,071	5,163	1,540	108	1,448	1,300
Talachulitna River			405	333	55	120	1,319	1,856	1,375	1,648	889	2,700
<u>West Cook Inlet Management Unit</u>												
Chuitna River				149	171	629	1,984	1,891	1,130	1,246	1,029	1,400
Lewis River							380	454	561	561	489	400
Theodore River							1,032	2,263	547	512	1,089	750
NCI Total	8,565	493	5,040	11,999	11,425	8,754	53,227	80,513	55,821	46,016	28,185	36,700

-continued-

**Table 1.-Page 3 of 4.**

Management Unit/Stream	1980 <sup>a,c</sup>	1981 <sup>a,c</sup>	1982 <sup>a</sup>	1983 <sup>a</sup>	1984 <sup>a</sup>	1985 <sup>a</sup>	1986 <sup>a</sup>	1987 <sup>a</sup>	1988 <sup>a</sup>	1989 <sup>a</sup>	1980-1989 Average	BEG <sup>b</sup>
<u>Knik Arm Management Unit</u>												
Little Susitna River				929	558	1,005		1,337	3,197		1,405	850
<u>Eastside Susitna Management Unit</u>												
Chulitna River			863	4,058	4,191	783		5,252			3,029	2,000
Clear Creek		169	982	938	1,520	2,430		1,949	4,850	1,974	1,852	1,300
Goose Creek		262	140	477	258	401	630	416	1,076	835	499	350
Little Willow Creek		459	316	1,042		1,305	2,133	1,330	1,515	1,325	1,178	650
Montana Creek		814	887	1,641	2,309	1,767		1,320	2,016	2,701	1,682	1,100
Prairie Creek		1,875	3,844	3,200	9,000	6,500	8,500	9,138	9,280	9,463	6,756	4,700
Sheep Creek		1,013	527	975	1,028	1,634	1,285	895	1,215	610	1,020	650
Willow Creek		1,357	821	898	3,464	2,900	2,580	3,460	3,286	5,860	2,736	1,750
<u>Westside Susitna Management Unit</u>												
Alexander Creek			2,546	3,755	4,620	6,241	5,225	2,152	6,273	3,497	4,289	2,700
Deshka River			16,000	19,237	16,892	18,151	21,080	15,028	19,200		17,941	11,200
Lake Creek	1,026	169	3,577	7,075		5,803		4,898	6,633		4,169	2,900
Peters Creek			4,000	2,272	324	2,901	1,915	1,302	3,927	959	2,200	1,300
Talachulitna River		2,025	3,101	10,014	6,138	5,145	3,686		4,112		4,889	2,700
<u>West Cook Inlet Management Unit</u>												
Chuitna River		1,362	3,438	4,043	2,845	1,600	3,946		3,024	990	2,656	1,400
Lewis River		560	606		947	861	722	875	616	452	705	400
Theodore River		535	1,368	1,519	1,251	1,458	1,281	1,548	1,906	1,026	1,321	750
NCI Total	1,026	10,600	43,016	62,073	55,345	60,885	52,983	50,900	72,126	29,692	58,327	36,700

-continued-

**Table 1.-Page 4 of 4.**

Management Unit/Stream	1990 <sup>a</sup>	1991 <sup>a</sup>	1992 <sup>a</sup>	1993 <sup>a</sup>	1994 <sup>a</sup>	1995 <sup>a</sup>	1996 <sup>a</sup>	1990-1996 Average	BEG <sup>b</sup>
<u>Knik Arm Management Unit</u>									
Little Susitna River	922	892	1,144		1,221	1,714	1,079	1,162	850
<u>Eastside Susitna Management Unit</u>									
Chulitna River	2,681	4,410	2,527	2,075	1,811	3,460	4,172	3,019	2,000
Clear Creek	2,380	1,974	1,530	886	1,204	1,928	2,091	1,713	1,300
Goose Creek	552	968	369	347	375	374	305	470	350
Little Willow Creek	1,115	498	673	705	712	1,210	1,077	856	650
Montana Creek	1,578	1,605	1,560	1,281	1,143	2,110	1,841	1,588	1,100
Prairie Creek	9,113	6,770	4,453	3,023	2,254	4,269	5,037	4,988	4,700
Sheep Creek	634	154			542	1,049	1,028	681	650
Willow Creek	3,065	2,753	2,643	3,448	2,245	4,626	2,987	3,110	1,750
<u>Westside Susitna Management Unit</u>									
Alexander Creek	2,596	2,727	3,720	2,763	1,514	2,090	2,319	2,533	2,700
Deshka River	18,166	8,112	7,736	5,769	2,665	4,156	6,343	7,564	11,200
Lake Creek	2,075	3,011	2,322	2,869	1,898	3,017	3,514	2,672	2,900
Peters Creek	2,027	2,458	996	1,668	573	1,041	749	1,359	1,300
Talachulitna River	2,694	2,457	3,648	3,269	1,575	2,521	2,748	2,702	2,700
<u>West Cook Inlet Management Unit</u>									
Chuitna River	480	537	1,337	2,085	1,012	1,162	1,343	1,137	1,400
Lewis River	182	303	445	531	164	146	257	290	400
Theodore River	642	508	1,053	1,110	577	694	368	707	750
<b>NCI Total</b>	<b>50,902</b>	<b>40,137</b>	<b>36,156</b>	<b>31,829</b>	<b>21,485</b>	<b>35,567</b>	<b>37,258</b>	<b>36,191</b>	<b>36,700</b>

<sup>a</sup> Helicopters were utilized as survey aircraft from 1974-1996.

<sup>b</sup> Biological escapement goal represents 66% of the average aerial escapement index count from 1979, 1982-1988, and 1990-1992.

<sup>c</sup> Weather conditions in 1980 and 1981 allowed only minimal counts in most streams.

**Table 2.-Comparison of aerial escapement index counts of chinook salmon for Clear and Prairie creeks, and for the Deshka River, 1993-1996.**

Stream	Count A		Count B		Percent Agreement
	Date	Count	Date	Count	
<b><u>1993</u></b>					
Clear Creek	7/21	886	7/24	860	97
Deshka River	7/22-24	5,670	7/28-30	5,769	98
Prairie Creek	7/24	3,200	7/27	3,023	95
<b><u>1994</u></b>					
Clear Creek	7/25	1,204	7/30	1,170	97
Deshka River	7/20-22	2,153	7/27-29	2,665	81
Prairie Creek	7/26	2,254	7/30	1,805	80
Willow Creek	7/20	2,114	7/29	2,245	94
<b><u>1995</u></b>					
Prairie Creek	7/23	3,884	7/28	4,269	91
<b><u>1996</u></b>					
Alexander Creek	7/21	2,319	7/26	2,130	92
Chuitna River	7/18	1,343	7/25	1,312	98
Theodore River	7/17	368	7/25	361	98
Average					93

accounted for almost half of this record escapement index count. From 1976 to 1990, the Deshka River drainage contributed from 25% to 50% of the total escapement index count of the NCIMA.

Agreement among different observers of aerial escapement index counts averaged 93% (Table 2). This comparison is limited because the counts were relatively small (less than 6,000 fish). However, the data indicate that different observers conducting aerial counts on these streams are consistent in their ability to see and enumerate spawning chinook salmon.

When comparing aerial escapement index counts to weir counts, four of the counts had agreements that ranged between 41% and 44% (Table 3). According to the observer, water visibility and light conditions during the 1995 survey of the Little Susitna River were outstanding, this could explain the higher percentage of agreement in 1995.

## DISCUSSION

The intent of this report is to compile the existing historical record of escapement index counts for spawning chinook salmon in NCIMA streams. This document should be useful to individuals involved in evaluating or modifying existing escapement goals for chinook salmon in the NCIMA.



In recent years, ADF&G has been improving methods for counting chinook salmon escapement in the Little Susitna and Deshka rivers with the use of weirs. Weir counts have provided an increase in the precision of counting spawning chinook salmon. The difference between aerial escapement index counts and weir counts is large. Observers in four of the five aerial surveys counted less than 50% of the spawning population. A combination of variables probably contributes to discrepancies between aerial and weir counts. Water visibility, spawning behavior, and light conditions are variables that can affect aerial counts either singularly or collectively. Observers count fish with different methods, such as by counting individual fish or groups of five or 10 fish. Riparian vegetation and undercut banks along the stream bank can block stream visibility, but during peak spawning most chinook salmon are in mid-channel. Another potential cause for these differences is stream life: chinook salmon may have a prolonged spawning period and only a portion of the escapement spawns at a given time. However, observers count all chinook salmon either dead or alive. Predation by bears is another potential cause for discrepancies between escapement index counts and weir counts. I believe that the differences between weir counts and escapement index counts can be attributed to a combination of the factors mentioned above and the many small tributaries that are difficult to survey due to riparian vegetation.

ADF&G is mandated to manage fishery resources on a sustained yield basis according to the Alaska Constitution. Under stable conditions, sustained yield management can be a simple principle. However, fish and animal populations are seldom stable. Effort or power of the harvesters constantly changes. The inherent variability of salmon production makes it necessary for ADF&G to assess some populations of salmon on an annual basis. Aerial escapement index counts is one method used to index numbers of spawning chinook salmon. Compiling escapement index counts across years provides managers with a time series database to compare production trends.

**Table 3.-Comparison of aerial escapement index counts to weir counts for the Little Susitna and Deshka rivers.**

Location/Date	Aerial Count	Weir Count	% Agreement
L. Susitna 7/18/88	3,197	7,712	42
L. Susitna 7/21/94	1,221	2,981	41
L. Susitna 7/20/95	1,714	2,872	60
Deshka R. 7/26/95	4,176	10,048	42
Deshka R. 7/24/96	6,343	14,354	44
Average			46

## RECOMMENDATIONS

1. Continue aerial escapement index counts.
2. Continue comparisons between aerial escapement index counts and weir counts.
3. Update this document on the same cycle as the Board of Fisheries meets to discuss Northern Cook Inlet allocative issues.

## ACKNOWLEDGMENTS

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**APPENDIX A.**  
**SUMMARY OF ESCAPEMENT INDEX COUNTS OF CHINOOK**  
**SALMON INTO STREAMS OF THE NORTHERN COOK INLET**  
**MANAGEMENT AREA, 1958-1996**

**Appendix A1.-Summary of escapement index counts of chinook salmon into streams of the Knik Arm Management Unit, 1958-1996.**

Year	Little Susitna River	Moose Creek
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		
1968		
1969	200	
1970	56	126
1971		40
1972	30	21
1973	374	36
1974		32
1975		55
1976	405	101
1977		153
1978		237
1979		253
1980		
1981		238
1982		406
1983	929	452
1984	558	541
1985	1,005	475
1986		419
1987	1,337	957
1988	3,197	1,072
1989		999
1990	922	545
1991	892	704
1992	1,144	959
1993		327
1994	1,221	946
1995	1,714	488
1996	1,079	652



**Appendix A2.-Summary of escapement index counts of chinook salmon into major streams of the Eastside Susitna River Management Unit, 1958-1996.**

Year	Chulitna River	Clear Creek	Goose Creek	Little Willow Ck	Montana Creek	Prairie Creek	Sheep Creek	Willow Creek	Other Streams		
									Indian Creek	Portage Creek	N. Fork Kashwitna R
1958				53	43		250				
1959							134				
1960											
1961				112	65		70				35
1962				26	75	142	35			27	19
1963				11	23	275	24			0	3
1964				7	69	138					14
1965				3	57	30	4				3
1966				38	100		100				
1967				6	2						
1968				12	5						
1969				150	200	175	250	290			0
1970				45	282	1,640		640			
1971		4			44			165			1
1972		91		99	317	630	101	370	35	68	31
1973	261	292		371	511	4,190	482	1,019	110	174	183
1974	200	283	41	139	280	1,498	202	402	122	260	103
1975	62	101	13	103	229	369	42	177	31	32	33
1976	2,106	1,237	160	833	1,145	6,513	455	1,747	537	702	303
1977	2,179	769	133	598	1,443	5,790	630	1,065	393	374	336
1978	1,021	997	283	436	881	5,154	1,209	1,263	114	140	234
1979		864		324	1,094		778	1,085	285	190	457
1981		169	262	459	814	1,875	1,013	1,357	422	659	558
1982	863	982	140	316	887	3,844	527	821	1,053	1,111	156
1983	4,058	938	477	1,042	1,641	3,200	975	898	1,193	3,140	297
1984	4,191	1,520	258		2,309	9,000	1,028	3,464	1,456	2,341	111
1985	783	2,430	401	1,305	1,767	6,500	1,634	2,900			457
1986			630	2,133		8,500	1,285	2,580			700
1987	5,252	1,949	416	1,330	1,320	9,138	895	3,460	1,246	2,616	872
1988		4,850	1,076	1,515	2,016	9,280	1,215	3,286	456	1,402	1,159
1989		1,974	835	1,325	2,701	9,463	610	5,860	660	1,309	355
1990	2,681	2,380	552	1,115	1,578	9,113	634	3,065	1,473	1,886	
1991	4,410	1,974	968	498	1,605	6,770	154	2,753	1,468	1,223	340
1992	2,527	1,530	369	673	1,560	4,453		2,643	479	1,078	470
1993	2,075	886	347	705	1,281	3,023		3,448	362	629	525
1994	1,811	1,204	375	712	1,143	2,254	542	2,245	336	857	430
1995	3,460	1,928	374	1,210	2,110	4,269	1,049	4,626	796	1,505	836
1996	4,172	2,091	305	1,077	1,841	5,037	1,028	2,987	579	2,185	782

**Appendix A3.-Summary of escapement index counts of chinook salmon into miscellaneous streams of the Eastside Susitna River Management Unit, 1958-1996.**

Year	Talkeetna Drainage	Chulitna Drainage								
	Disappointment Creek	Troublesome Creek	Tokositna River	Alder Creek	Bunco Creek	Spink Creek	Byers Creek	Coal Creek	Pass Creek	Honolulu Creek
1958	5	100	0	0		60				
1959										
1960										
1961										
1962	0							5	15	
1963				0		0		0	0	
1964							2			
1965							4			
1966										
1967										
1968										
1969										
1970										
1971		5					2			
1972		5					7			
1973	20	7			34		1		8	17
1974		14					0			12
1975										
1976		95			112		53			24
1977					136		69			36
1978		192			153					13
1979		58					28			37
1981										
1982		36			198	0	15			27
1983					523					
1984					51					
1985										
1986										
1987										
1988										
1989										
1990										
1991										
1992										
1993										
1994										
1995										
1996										

-continued-

### Appendix A3.-Page 2 of 3.

	Susitna Drainage														
	Kashwitna	Rabideux	Sunshine	Question	Birch	Trapper	Cache	Whiskers	Chase	Slash	Gash	Lane	Clyde	Maggot	Lwr Mc-
Year	River	Creek	Creek	Creek	Creek	Creek	Creek	Creek	Creek	Crk	Crk	Crk	Crk	Creek	Kenzie
1958													5		
1959															
1960															
1961	35			0	0										
1962													0		
1963															
1964			8												
1965															
1966															
1967															
1968															
1969															
1970															
1971															
1972															
1973															
1974															
1975								22							
1976															
1977		99													
1978															
1979															
1981								0				40			0
1982								0	15		0	47			0
1983								3	0	0	0	12			0
1984		8	1		16	15	0	67	3	0	0	23	0	0	0
1985															
1986															
1987															
1988															
1989															
1990															
1991															
1992															
1993															
1994															
1995															
1996															

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Year	Susitna Drainage												
	McKenzie Creek	Little Portage Crk	Deadhorse Creek	5th of July Cr	Skull Creek	Sherman Creek	4th of July Crk	Gold Crk	Jack Long Creek	Cheechako Creek	Chinook Creek	Devil Crk	Fog Crk
1958													
1959													
1960													
1961													
1962	0		0							0			
1963													
1964													
1965													
1966													
1967													
1968													
1969													
1970													
1971													
1972													
1973													
1974							0						
1975							0						
1976													
1977													
1978													
1979													
1981	0		0	0	0	0	0		0				
1982	0	0		3	0	3	5	21	2	16	5	0	
1983	0	0	0	0	0	0	6	23	0	25	8	1	
1984	0	0	0	17	0	0	92	23	7	29	15	0	2
1985													
1986													
1987													
1988													
1989													
1990													
1991													
1992													
1993													
1994													
1995													
1996													

**Appendix A4.-Summary of escapement index counts of chinook salmon into major streams of the Westside Susitna River Management Unit, 1958-1996.**

Year	Yentna Drainage					Others
	Alexander Crk	Deshka River	Lake Creek	Peters Creek	Talachulitna R	Cache Crk
1958		3			0	0
1959						
1960						
1961	0		60		32	
1962	19	998	10	9	78	4
1963	750	131	4	5	56	
1964	205	2,422	45	12	95	
1965	416	2,749	172	101	69	
1966	300	933	300		15	
1967	500	1,535	1,000			
1968	727	4,863	1,300			
1969	735	5,652	1,540			
1970	562	5,286	54			
1971		161	119			
1972	202	1,780	920	95	405	
1973	875	2,381	761		333	
1974	2,193	5,279	535	147	55	
1975	1,878	4,737	281	13	120	
1976	5,412	21,693	3,735	3,071	1,319	61
1977	9,246	39,642	7,391	5,163	1,856	100
1978	5,854	24,639	8,931	1,540	1,375	
1979	6,215	27,385	4,196	108	1,648	
1980			1,026			
1981			169		2,025	
1982	2,546	16,000	3,577	4,000	3,101	
1983	3,755	19,237	7,075	2,272	10,014	497
1984	4,620	16,892		324	6,138	
1985	6,241	18,151	5,803	2,901	5,145	216
1986	5,225	21,080		1,915	3,686	
1987	2,152	15,028	4,898	1,302		556
1988	6,273	19,200	6,633	3,927	4,112	
1989	3,497			959		
1990	2,596	18,166	2,075	2,027	2,694	484
1991	2,727	8,112	3,011	2,458	2,457	499
1992	3,720	7,736	2,322	996	3,648	487
1993	2,763	5,769	2,869	1,668	3,269	1,690
1994	1,514	2,665	1,898	573	1,575	628
1995	2,090	4,176	3,017	1,041	2,521	1,601
1996	2,319	6,343	3,514	794	2,748	581

**Appendix A5.-Summary of escapement index counts of chinook salmon into miscellaneous streams of the Westside Susitna River Management Unit, 1958-1996.**

Year	Bear Creek	Canyon Creek	Donkey Creek	Red Creek	Whitsol Creek	Fish Creek	Moose Creek	Pickle Creek	Hungryman Creek	Granite Creek	Fish Lake Creek
1958				27							
1959											
1960											
1961											
1962	9	23		11							
1963	13	0	0			0					
1964	4										
1965							26				53
1966											
1967											
1968											
1969											
1970											
1971											
1972	12	8									
1973		29	25							4	
1974		10									
1975		2									
1976	15	44									
1977	298	135	159	1,511		132					131
1978			163	385							66
1979											
1980											
1981		84		749							
1982	100		100					100	100		
1983		575									250
1984					0						
1985											
1986											
1987											
1988											
1989											
1990			363								
1991			161								
1992											
1993											
1994				451							
1995				408							
1996											

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Year	Eightmile Creek	Quartz Creek	Contact Creek	Dickason Creek	Squaw Creek	Hewitt Creek	Huckleberry Creek	Johnson Creek	Kichatna River	Nakochna River	Clearwater Creek
1958								0			
1959											
1960											
1961	0										
1962	2					0		0			13
1963								0	0		0
1964											
1965											
1966											
1967											
1968											
1969											
1970											
1971											
1972							1				
1973					10	0				12	6
1974										2	
1975							328				
1976		0									
1977		8		4					120		47
1978							311				
1979		5					500				
1980							1,000				
1981		8									
1982			100						1,000	100	100
1983						0					
1984											
1985											
1986											
1987											
1988											
1989											
1990											
1991											
1992											
1993											
1994	104										
1995											
1996											

**Appendix A6.-Summary of escapement index counts of chinook salmon into streams of the West Cook Inlet Management Unit, 1958-1996.**

Year	Major Rivers			Miscellaneous Streams						
	Chuitna River	Lewis River	Theodore River	Olsen Creek	Coal Creek	Drill Creek	Bishop Creek	Straight Creek	Nikolai Creek	Scarp Creek
1958										
1959										
1960										
1961										
1962										
1963										
1964										
1965										
1966										
1967										
1968										
1969										
1970										
1971										
1972										
1973	149									
1974	171									
1975	629									
1976	1,984	380	1,032	247		11		59	11	
1977	1,891	454	2,263	1,229			468	24	143	
1978	1,130	561	547	94	1,551	77		108		
1979	1,246	561	512	17	178	11	30			
1980										
1981	1,362	560	535	116				126	26	
1982	3,438	606	1,368	188		697		388	520	184
1983	4,043		1,519							
1984	2,845	947	1,251							
1985	1,600	861	1,458	192	823	337	203			145
1986	3,946	722	1,281	165						
1987		875	1,548							
1988	3,024	616	1,906							
1989	990	452	1,026							
1990	480	182	642							
1991	537	303	508							
1992	1,337	445	1,053							
1993	2,085	531	1,110						156	
1994	1,012	164	577	59	309					
1995	1,162	146	694		221					
1996	1,343	257	368		424					



**APPENDIX B.**  
**ESCAPEMENT INDEX COUNTS OF CHINOOK SALMON INTO**  
**STREAMS OF THE NORTHERN COOK INLET MANAGEMENT**  
**AREA, 1958-1996**

**Appendix B1.-Historical escapement index counts of chinook salmon into streams of the Knik Arm Management Unit, 1958-1996.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Little Susitna River</u></b>					
1969 7/16	200	Parks Hwy Bridge to Hatcher Pass Bridge	fair	Stewart	counted only 30% of the stream (shallows)
1970 7/21	56	Upper 5 miles	fair	Bush	only saw 30% of the stream
1972 8/10	30	Burma Road to Parks Hwy Bridge	good	Watsjold	boat survey
1973 7/23	374	Parks Hwy Bridge to Hatcher Pass Bridge	excellent	Watsjold	
1976 7/15	405	Parks Hwy Bridge to Hatcher Pass Bridge	excellent	Watsjold	
1983 7/19	929	Mouth to Hatcher Pass Bridge	excellent	Bentz	
1984 8/1	558	Parks Hwy Bridge to Hatcher Pass Bridge	normal	Bradley	75% were spawned out
1985 8/1	1,005	Parks Hwy Bridge to Archangel Ck	normal	Sweet	30% were spawned out
1986	nc				no count
1987 7/21	1,337	Parks Hwy Bridge to Hatcher Pass Bridge	good	Sweet	peak spawning
1988 7/18	3,197	Weir to Motherlode Lodge	good	Rutz	active spawning
1989	nc				4,367 weir count
1990 7/18	922	Parks Hwy Bridge to Archangel Ck	normal	Sweet	less than 1% spawned out
1991 7/27	892	Parks Hwy Bridge to Archangel Ck	normal	Sweet	only 12 spawned out
1992 7/23	1,144	Burma Rd to Motherlode Lodge		Bartlett	
1993	nc				no count
1994 7/21	1,221	Weir to Archangel Ck	excellent	Sweet	weir count 2,981
1995 7/20	1,714	Weir to Archangel Ck	excellent	Sweet	weir count 2,872
1996 7/20	1,079	Lake Ck to Archangel Ck	normal	Sweet	

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## Appendix B1.-Page 2 of 2.

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Moose Creek - Foot Surveys</u></b>					
1970 7/24	126	Mouth to first waterfall	excellent	Watsjold	only 9 spawned out
1971 7/28	40	Mouth to first waterfall	normal	Redick	
1972 7/31	21	Mouth to first waterfall	excellent	Redick	
1973 8/1	36	Mouth to first waterfall	excellent	Dunham	
1974 8/1	32	Mouth to first waterfall	excellent	Kalb	
1975 8/1	55	Mouth to first waterfall	excellent	Watsjold	
1976 7/28	101	Mouth to first waterfall	excellent	Watsjold	
1977 7/25	153	Mouth to first waterfall	excellent	Bradley	
1978 7/17	237	Mouth to first waterfall	excellent	Watsjold	8 were above the falls
1979 7/23	253	Mouth to first waterfall	excellent	Engel	
1980					no count
1981 7/27	238	Mouth to first waterfall	normal	Sweet	
1982 7/20	406	Mouth to first waterfall	excellent	Engel	6 spawned outs
1983 7/19	452	Mouth to first waterfall	excellent	Engel	34 above the falls
1984 7/30	541	Mouth to first waterfall	excellent	Sweet	1/3 spawned out below Glenn Hwy Bridge
1985 8/2	475	Mouth to first waterfall	poor	Havens	300 above the Glenn Hwy Bridge
1986 7/19	419	Mouth to first waterfall	excellent	Engel	only 16 spawned outs
1987 7/21	957	Mouth to first waterfall	excellent	Hepler	574 above the Glenn Hwy Bridge
1988 7/28	1,072	Mouth to the mine	excellent	Lafferty	
1989 7/17	999	Mouth to the Powerline Bridge	normal	Sweet	
1990 7/16	545	Mouth to above Powerline Bridge	normal	Sweet	
1991 7/25	704	Mouth to above Powerline Bridge		Sweet	Half above the Glenn Hwy Bridge
1992 7/20	959	Mouth to first waterfall		Bartlett	41 spawned outs
1993 7/27	327	Mouth to above Powerline Bridge	poor	Andel	half were spawned out
1994 7/22	946	Mouth to above Powerline Bridge	normal	Baer	Half above the Glenn Hwy Bridge
1995 7/16	488	Mouth to above Powerline Bridge	normal	Sweet	Half above the Glenn Hwy Bridge
1996 7/18	652	Mouth to above Powerline Bridge	normal	Sweet	

**Appendix B2.-Historical escapement index counts of chinook salmon into major streams of the Eastside Susitna Management Unit, 1958-1996.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Chulitna River - East Fork</b>					
1973 8/2	41	Confluence upstream to the canyon	excellent	Engel	Super cub
1973 8/2	42	Confluence upstream to the canyon	excellent	Watsjold	Helicopter
1974 7/25	41	Confluence upstream to the canyon	normal	Watsjold	Super cub
1975 8/4	7	Confluence upstream to the canyon	excellent	Engel	Super cub
1976 7/23	112	Confluence upstream to the canyon	excellent	Engel	Super cub
1977 7/21	168	Confluence upstream to the canyon	excellent	Engel	Super cub
1978 7/25	59	Confluence upstream to the canyon	excellent	Havens	Super cub
1979	nc				no count
1980	nc				no count
1981	nc				Bentz 1982
1982	119	Confluence upstream to the canyon			Bentz 1983
1983	nc				Bentz 1984
1984	4,191	no idea-could be all three segments			Combined Hepler & Bentz 1985
1985	783	no idea-could be all three segments			Hepler & Bentz 1986
1986	nc				Hepler & Bentz 1987
1987	5,252	no idea-could be all three segments			Hepler et al. 1988
1988	nc				no count
1989	nc				no count
1990 7/16	685	Confluence upstream to the canyon		Sweet	
1991 7/26	931	Confluence upstream to the canyon	excellent	Sweet	
1992 7/26	575	Confluence to headwaters	excellent	Sweet	
1993 7/24	505	Confluence to headwaters	excellent	Sweet	late count over 50% spawned out
1994 7/28	268	Confluence to headwaters	excellent	Sweet	outstanding counting conditions
1995 7/27	938	Confluence to headwaters	excellent	Sweet	
1996 7/24	874	Confluence to headwaters	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Chulitna River - Middle Fork</u></b>					
1973 8/2	206	Confluence to Parks Hwy Bridge	excellent	Engel	Super cub
1973 8/2	219	Confluence to Parks Hwy Bridge	excellent	Watsjold	Helicopter
1974 7/25	159	Confluence to Parks Hwy Bridge	normal	Watsjold	Super cub
1975 8/4	55	Confluence to Parks Hwy Bridge	excellent	Engel	Super cub
1976 7/23	1,994	Confluence to glacial water & mainstem	excellent	Engel	Super cub
1977 7/21	2,011	Confluence to glacial water & mainstem	excellent	Engel	Super cub
1978 7/26	962	Confluence to glacial water & mainstem	excellent	Havens	Super cub
1979	nc				no count
1980	nc				no count
1981	nc				Bentz 1982
1982	744	Confluence to glacial water & mainstem			Bentz 1983 <sup>a</sup>
1983	4,058	Confluence to glacial water & mainstem			Bentz 1984 <sup>a</sup>
1984 <sup>b</sup>		no idea-see E fork-only one number reported			Combined Hepler & Bentz 1985
1985 <sup>b</sup>		no idea-see E fork-only one number reported			Combined Hepler & Bentz 1986
1986	nc				no count
1987 <sup>b</sup>		no idea-see E fork-only one number reported			Combined Hepler et al. 1988
1988	nc				no count
1989	nc				no count
1990 7/16	1,996	Confluence to glacial water	?	?	Helicopter
1991 7/26	3,479	Confluence to glacial water	excellent	?	
1992 7/26	1,952	Confluence to glacial water	excellent	Sweet	
1993 7/24	1,570	Confluence to glacial water	excellent	Sweet	Late count many carcasses
1994 7/28	1,543	Confluence to glacial water	excellent	Sweet	Outstanding counting conditions
1995 7/27	2,522	Confluence to glacial water	excellent	Sweet	
1996 7/24	3,298	Confluence to glacial water	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Clear Creek - Chunilna Creek</b>					
1971 8/4	4	Confluence to upper airstrip	fair	Watsjold	
1972 7/30	91	Confluence to upper airstrip	excellent	Watsjold	
1973 7/25	245	Confluence to upper airstrip	excellent	Engel	Super cub
1973 7/28	292	Confluence to upper airstrip	excellent	Watsjold	
1974 7/27	236	Confluence to upper airstrip	excellent	Watsjold	Super cub
1974 7/31	283	Confluence to upper airstrip	normal	Watsjold	
1975 7/28	101	Confluence to upper airstrip	normal	Watsjold	
1976 7/16	1,220	Confluence to upper airstrip	excellent	Engel	Super cub
1976 7/23	1,237	Confluence to upper airstrip	normal	Watsjold	turbulences in lower reaches - fast count
1977 7/22	769	Confluence to upper airstrip	excellent	Watsjold	
1978 7/25	997	Confluence to upper airstrip	excellent	Watsjold	
1979 7/26	864	Confluence to upper airstrip	normal	Watsjold	slightly turbid in near confluence
1980	nc				no count
1981 7/31	169	Confluence to upper airstrip	poor	Bradley	several large schools of chums and high water
1982	982	no information			Bentz 1983
1983 7/18	938	Confluence to upper airstrip	normal	Bentz	hard counting large schools & glare
1984	1,520	Confluence to upper airstrip			Hepler & Bentz 1985
1985	2,430	Confluence to upper airstrip			Hepler & Bentz 1986
1986	nc				Hepler & Bentz 1987
1987	1,949	Confluence to upper airstrip			unknown
1988	4,850	Confluence to upper airstrip			Hepler et al. 1989
1989	nc				no count
1990 7/17	2,380	Confluence to upper airstrip			
1991 7/22	1,974	Confluence to upper airstrip	normal		poor visibility in lower canyon, improves upst
1992 7/22	1,530	Confluence to upper airstrip		Bartlett	
1993 7/21	886	Confluence to upper airstrip	normal	Lafferty	
1993 7/24	860	Confluence to upper airstrip	normal	Whitmore	
1994 7/25	1,204	Confluence to upper airstrip	excellent	Sweet	
1994 7/30	1,170	Confluence to upper airstrip	excellent	Whitmore	
1995 7/21	1,928	Confluence to upper airstrip	good	Baer	
1996 7/22	2,091	Confluence to upper airstrip	normal	Baer	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Goose Creek</u></b>					
1974 7/26	41	Parks Hwy upstream to Sheep Ck Confluence	normal	Engel	Super cub
1975 8/3	13	Parks Hwy upstream to Sheep Ck Confluence	normal	Watsjold	Super cub
1976 7/15	160	Parks Hwy upstream to Sheep Ck Confluence	normal	Engel	Super cub
1976 7/23	104	Parks Hwy upstream to Sheep Ck Confluence	poor	Watsjold	
1977 7/20	133	Parks Hwy upstream to Sheep Ck Confluence	excellent	Watsjold	
1978 7/25	283	Parks Hwy upstream to Sheep Ck Confluence	excellent	Watsjold	
1979	nc	Parks Hwy upstream to Sheep Ck Confluence			no count
1980	nc	Parks Hwy upstream to Sheep Ck Confluence			no count
1981 7/31	262	Parks Hwy upstream to Sheep Ck Confluence	excellent	Engel	
1982	140	Parks Hwy upstream to Sheep Ck Confluence		Barrett	Bentz 1983
1983 7/18	477	Mouth to Sheep Creek Confluence	normal	Bentz	
1984 7/31	258	Mouth to Sheep Creek Confluence	normal	Sweet	1/4 spawned out - past peak
1985 8/1	401	Mouth to Sheep Creek Confluence	normal	Bentz	
1986 7/17	630	Mouth to Sheep Creek Confluence	excellent	Hepler	See Sheep Creek stream file
1987	416	Mouth to Sheep Creek Confluence			Hepler et al. 1988
1988	1,076	Mouth to Sheep Creek Confluence			Hepler et al. 1989
1989 7/18	835	Mouth to Sheep Creek Confluence	normal	Sweet	
1990 7/19	552	Mouth to Sheep Creek Confluence	normal	Sweet	
1991 7/25	968	Mouth to Sheep Creek Confluence	normal	Sweet	slightly turbid water from Sheep Creek
1992 7/19	369	Mouth to Sheep Creek Confluence	silty	Sweet	
1993 7/20	347	Mouth to Sheep Creek Confluence	normal	V-Lang	
1994 7/22	375	Mouth to Sheep Creek Confluence	excellent	Sweet	outstanding visibility
1995 7/23	374	Mouth to Sheep Creek Confluence	good	Lafferty	
1996 7/19	305	Mouth to Sheep Creek Confluence	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Little Willow Creek</u></b>					
1958 6/28	53			FWS	
1961 6/27	112			ADF&G	
1962 7/16	26			ADF&G	
1963 7/09	11			ADF&G	
1964 8/13	7			ADF&G	
1965 7/06	3	Parks Hwy to one mile above railroad bridge		ADF&G	
1966	38	Parks Hwy to one mile above railroad bridge		ADF&G	
1967	6	Parks Hwy to one mile above railroad bridge		ADF&G	
1968	12	Parks Hwy to one mile above railroad bridge		ADF&G	
1969 6/24	150	Parks Hwy to one mile above railroad bridge		Stewart	all chinook salmon at the mouth
1969 7/03	45	Parks Hwy to one mile above railroad bridge		Kubik	all chinook salmon at the mouth
1969 7/16	83	Parks Hwy to one mile above railroad bridge	excellent	Stewart	less than 50% seen by observer
1970 7/28	45	Parks Hwy to one mile above railroad bridge	normal	Watsjold	only 20%-30% were observed, all fish in up half
1971	nc				no count
1972 8/01	99	Parks Hwy to one mile above railroad bridge	excellent	Watsjold	
1973 7/25	371	Mouth upstream to canyon entrance	excellent	Watsjold	
1973 7/25	233	Mouth upstream to canyon entrance	excellent	Engel	Super cub
1974 7/31	139	Mouth upstream to canyon entrance	fair	Watsjold	
1974 8/01	109	Mouth upstream to canyon entrance	excellent	Watsjold	Super cub
1975 7/28	103	Mouth upstream to canyon entrance	normal		

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Little Willow Creek - Continued</u></b>					
1976 7/15	833	Mouth upstream to canyon entrance	normal		
1977 7/20	598	Mouth upstream to canyon entrance	excellent		
1978 7/25	436	Mouth upstream to canyon entrance	excellent		
1979 7/26	324	Mouth upstream to canyon entrance	fair		
1980	nc				no count
1981 7/31	459	Mouth upstream to canyon entrance	excellent	Engel	
1982 8/07	316	Mouth upstream to canyon entrance	good	Engel	
1983 7/19	1,042	Mouth to headwaters	good	Bentz	900 from bridge to treeline
1984	nc				no count
1985 8/01	1,305	Mouth to headwaters	fair	Bentz	
1986 6/17	2,133	Parks Hwy to headwaters	excellent	Hepler	Month is incorrect, suspect month of July
1987 7/26	1,330	Mouth to headwaters	normal	Rutz	
1988	1,515	Mouth to headwaters			Hepler et al. 1989
1989 7/18	1,325	Mouth to headwaters	normal	Sweet	
1990 7/18	1,115	Mouth to headwaters	excellent	Sweet	
1991 7/23	498	Mouth to headwaters			
1992 7/18	673	Mouth to headwaters	normal	Sweet	
1993 7/20	705	Mouth to headwaters	normal	V-Lang	
1994 7/20	712	Mouth to headwaters	excellent	Sweet	
1995 7/20	1,210	Mouth to headwaters	good	Sweet	
1996 7/19	1,077	Mouth to headwaters	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Montana Creek</b>					
1958 6/28	present			FWS	
1958 7/03	4			FWS	
1958 7/11	43			FWS	
1959	nc				
1960	nc				
1961 7/13	65			ADF&G	
1962 6/30	75			ADF&G	
1963 7/09	23			ADF&G	
1964 8/05	69	Mouth to north fork falls		Downey	
1965 8/03	57			ADF&G	
1966	100				
1967	2				
1968	5				
1969 6/24	50			Stewart	All fish at the mouth
1969 7/03	200			Kubik	150 at the mouth & 50 under railroad bridge
1969 7/15	150			Redick	Foot and aerial survey
1969 7/16	92			Stewart	Extreme glare
1970 7/27	282	Parks Hwy bridge to forks	fair	Watsjold	261 on foot survey
1971 8/05	44	Parks Hwy bridge including all three forks	fair	Dearborn	foot survey
1972 7/25	317	Parks Hwy bridge including all three forks	excellent	Watsjold	foot survey
1973 7/24	511	Parks Hwy bridge including all three forks	excellent	Engel	foot survey
1973 7/24	225	Parks Hwy bridge including all three forks	excellent	Watsjold	Super cub
1973 7/25	341	Parks Hwy bridge including all three forks	excellent	Watsjold	Helicopter
1974 7/29	280	Parks Hwy bridge including all three forks	excellent	Watsjold	foot survey
1975 7/29	229	Parks Hwy bridge including all three forks	excellent		foot survey
1976 7/26	1,145	Parks Hwy bridge including all three forks	excellent		foot survey
1977 7/19	1,443	Parks Hwy bridge including all three forks	excellent		foot survey
1978 7/27	881	Parks Hwy bridge including all three forks			foot survey

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Montana Creek - Continued</b>					
1979 7/30	1,094	Parks Hwy bridge including all three forks	excellent		foot survey with 38 spawned out
1980	nc				no count
1981 7/30	814	Parks Hwy bridge including all three forks	excellent	Engel	
1982 8/05	887		good	Engel	
1983 6/28	307		excellent	Bentz	foot survey
1983 7/15	1,641		excellent	Sweet	foot survey
1984 6/27	337	Above Hwy bridge	poor	Bentz	foot survey
1984 7/24	2,309	Above railroad bridge	normal	Bentz	foot survey
1985 8/02	1,767	Above railroad bridge	normal	Bradley	foot survey
1986	nc				no count
1987	1,320	Above railroad bridge			Hepler et al. 1988
1988	2,016	Above railroad bridge			Hepler et al. 1989
1989 7/18	2,701	Above railroad bridge	excellent	Sweet	foot survey
1990 7/17	1,578	Above railroad bridge	normal	Sweet	foot survey
1990 7/17	1,269	Mouth to Yoder Road			
1991 7/22	1,605	Mouth to Yoder Road			
1992 7/22	1,560	Mouth to barrier falls	normal	Bartlett	
1993 7/20	1,281	Mouth to Yoder Road	normal	V-Lang	
1994 7/25	1,143	Mouth to barrier falls	excellent	Sweet	
1995 7/21	2,110	Mouth to barrier falls	normal	Baer	
1996 7/18	1,841	Mouth to barrier falls	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Prairie Creek</u></b>					
1962	142				
1963	275				
1964	138				
1965	30				
1969 8/01	175	Only 30% of the stream counted		Kubik	
1970 8/06	1,640		excellent	Kubik	
1972 7/30	630	Mainstem only - Mouth to Lake	excellent	Watsjold	
1973 7/27	4,190	Mainstem only	excellent	Bradley	foot survey
1973 7/28	3,286	Mainstem and Grizzly Creek	excellent	Engel	
1974 7/26	1,498	Mainstem only	excellent	Bradley	foot survey
1975 8/04	369	Mainstem only	excellent	Bradley	foot survey
1976 7/20	6,513	Mainstem and Grizzly Creek	excellent	Bradley	foot survey
1977 7/21	5,790		excellent	Bradley	foot survey
1978 7/27	5,154		excellent	Bradley	foot survey
1979	nc				no count
1980	nc				no count
1981 7/31	1,875	Mainstem and Grizzly Creek	poor	Bradley	
1982	3,844				Bentz 1983
1983	3,200				Bentz 1984
1984	9,000				Hepler & Bentz 1985
1985	6,500				Hepler & Bentz 1986
1986 7/25	8,500	Mainstem and Grizzly Creek	normal		
1987	9,138	Mainstem only			Hepler et al. 1988
1988	9,280	Mainstem and Grizzly Creek			Hepler et al. 1989

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**Appendix B2.-Page 10 of 21.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Prairie Creek - Continued</u></b>					
1989 7/28	9,463		normal		
1990 7/17	9,113				
1991 7/24	6,770		normal		
1992 7/22	4,453	Mainstem	normal	Sweet	
1993 7/27	3,023	Mainstem and Grizzly Creek	normal	Lafferty	
1993 7/24	3,200	Mainstem and Grizzly Creek	normal	Whitmore	only a rough estimate use Lafferty's estimate
1994 7/26	2,254	Mainstem and Grizzly Creek	normal	Sweet	
1994 7/30	1,805	Mainstem and Grizzly Creek	normal	Whitmore	
1995 7/23	3,884	Mainstem and Grizzly Creek	fair	Lafferty	
1995 7/28	4,269	Mainstem and Grizzly Creek	good	Sweet	
1996 7/22	5,037	Mainstem and Grizzly Creek	normal	Bartlett	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Sheep Creek</u></b>					
1958 6/15	250	First 3 miles		FWS	All fish located at the mouth - boat & foot
1958 6/28	134	First 19 miles		FWS	boat & foot surveys
1958 7/03	4	First 1/2 mile		FWS	
1959	nc				no count
1960	nc				no count
1961 7/06	70			ADF&G	
1962 7/16	35			ADF&G	
1963 8/07	24				
1964	nc			ADF&G	Fish present
1965 7/07	4			ADF&G	
1966	100			ADF&G	All fish located at the mouth
1967	nc				no count
1968	nc				no count
1969 6/24	250			Stewart	All fish located at the mouth
1969 7/03	0			Kubik	Stream too turbid to count
1969 7/16	0			Stewart	Stream too turbid to count
1970	nc				no count
1971	nc				no count
1972 8/01	101	Mouth to headwaters	excellent	Watsjold	Most spawning in upper half of stream
1973 7/24	444	Mouth to headwaters	excellent	Engel	Super cub
1973 7/26	482	Mouth to headwaters	excellent	Watsjold	
1974 7/26	202	Mouth to headwaters	normal	Engel	Super cub
1975 8/03	42	Mouth to headwaters	normal	Watsjold	Super cub
1976 7/15	394	Mouth to headwaters	normal	Engel	Super cub
1976 7/23	455	Mouth to headwaters	fair	Watsjold	
1977 7/20	630	Mouth to headwaters	excellent	Watsjold	
1978 7/25	1,209	Mouth to headwaters	excellent	Watsjold	
1979 7/26	778	Mouth to headwaters	fair	Watsjold	Lower half too turbid to count

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Sheep Creek-Continued</u></b>					
1980	nc	Mouth to headwaters			no count
1981 7/31	1,013	Mouth to headwaters	excellent	Engel	
1982	527	Mouth to headwaters			Bentz 1983
1983 7/18	975	Mouth to headwaters	normal	Bentz	
1984 7/31	1,028	Mouth to headwaters	normal	Sweet	1/4 spawned out
1985 8/01	1,634	Mouth to headwaters	fair	Bentz	110 spawned out
1986 7/17	1,285	Mouth to headwaters	excellent	Hepler	
1987	895	Mouth to headwaters			Hepler et al. 1988
1988	1,215	Mouth to headwaters			Hepler et al. 1989
1989 7/18	610	Mouth to headwaters	normal	Sweet	
1990 7/19	634	Mouth to headwaters	fair	Sweet	
1991 8/10	154	Mouth to headwaters	fair	Sweet	Half were spawn outs
1992	nc			Sweet	Turbid water conditions
1993	nc			Sweet	Turbid water conditions
1994 7/22	542	Mouth to headwaters	excellent	Sweet	Outstanding counting conditions
1995 7/23	1,049	Mouth to headwaters	normal	Lafferty	
1996 7/22	1,028	Mouth to headwaters	normal	Bartlett	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Willow Creek</u></b>					
1969 6/24	100			Stewart	All fish at the mouth
1969 7/03	102	Mouth to Parks Hwy bridge		Kubik	
1969 7/16	185		poor	Stewart	missed 50% of the fish due to glare
1969 7/23	290	Mouth to canyon and Deception Creek	excellent	Redick	Foot and boat survey
1970 7/23	640	Mouth to canyon and Deception Creek	good	Redick	Foot and boat survey
1971 8/05	165	Mouth to canyon and Deception Creek	normal		Foot and boat survey
1972 7/28	370	Mouth to canyon and Deception Creek	excellent	Watsjold	Foot and boat survey
1973 7/24	678	Mouth to canyon	excellent	Watsjold	Super cub
1973 7/25	771	Mouth to canyon	excellent	Watsjold	
1973 7/25	1,019	Mouth to canyon and Deception Creek	excellent	Kolb	Foot and boat survey
1974 7/26	402	Mouth to canyon and Deception Creek	excellent	Watsjold	Foot and boat survey
1975 8/04	177	Mouth to canyon and Deception Creek	excellent	Watsjold	Foot and boat survey
1976 7/15	1,747	Mouth to canyon and Deception Creek	excellent		Foot and boat survey
1977 7/20	1,065	Mouth to canyon and Deception Creek	excellent		Foot and boat survey
1978 7/26	671	Mouth to canyon	normal		Foot and boat survey
1979 7/26	847	Mouth to canyon	fair		Foot and boat survey
1980	nc				
1981 7/29	991	Mouth to canyon	excellent	Engel	
1982 8/06	592	Mouth to canyon	excellent	Sweet	Foot and boat survey
1983 6/28	1,191	Mouth to canyon	normal	Engel	
1983 7/19	777	Mouth to canyon	excellent	Havens	Foot and boat survey
1984 6/27	700	Mouth to canyon	excellent	Bentz	
1984 7/31	2,789	Mouth to canyon	excellent	Bentz	
1985 8/01	1,856	Mouth to canyon	normal	Bentz	
1986 7/15	2,059	Mouth to canyon	normal	Hepler	
1987 7/21	2,768	Mouth to canyon	good	Rutz	
1988	2,496	Mouth to canyon			Hepler et al. 1989
1989 7/18	5,060	Mouth to canyon			Sweet & Webster 1990

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**Appendix B2.-Page 14 of 21.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Willow Creek - Continued</u></b>					
1990 7/20	2,365	Mouth to canyon	excellent	Sweet	
1991 7/23	2,006	Mouth to canyon	excellent		
1992 7/24	1,660	Mouth to canyon	excellent	Bartlett	
1993 7/20	2,227	Mouth to canyon	normal	Whitmore	
1994 7/20	1,826	Mouth to canyon	normal	Sweet	
1994 7/29	1,479	Mouth to canyon	excellent	Sweet	
1995 7/21	3,792	Mouth to canyon	excellent	Sweet	
1996 7/19	1,776	Mouth to canyon	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Deception Creek</u></b>					
1978 7/26	592	Highway bridge to canyon	excellent		Foot survey
1979 7/30	278	Highway bridge to canyon	excellent		Foot survey
1980	nc				no count
1981 7/29	366	Highway bridge to canyon	excellent	Engel	
1982 8/06	229	Highway bridge to canyon	normal		Foot survey
1983	121	Highway bridge to canyon			Foot survey from egg take crew?
1984	675	Highway bridge to canyon			Foot survey from egg take crew?
1985	1,044	Highway bridge to canyon			Foot survey from egg take crew?
1986	521	Highway bridge to canyon			Foot survey from egg take crew?
1987	692	Highway bridge to canyon			Foot survey from egg take crew?
1988	790	Highway bridge to canyon			Foot survey from egg take crew?
1989	800	Highway bridge to canyon			Foot survey from egg take crew?
1990	700	Highway bridge to canyon			Foot survey from egg take crew?
1991	747	Highway bridge to canyon			Foot survey from egg take crew?
1992	983	Highway bridge to canyon			Foot survey from egg take crew?
1993	1,221	Highway bridge to canyon			Foot survey from egg take crew?
1994 7/20	288	Confluence to canyon	excellent	Sweet	
1994 7/29	766	Confluence to canyon	excellent	Sweet	
1995 7/21	834	Confluence to canyon	excellent	Sweet	
1996 7/19	1,211	Confluence to canyon	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Willow Creek Combined with Deception Creek</b>					
1969 6/24	100			Stewart	All fish at the mouth
1969 7/03	102	Mouth to Parks Hwy bridge		Kubik	
1969 7/16	185		poor	Stewart	missed 50% of the fish due to glare
1969 7/23	290	Mouth to canyon and Deception Creek	excellent	Redick	Foot and boat survey
1970 7/23	640	Mouth to canyon and Deception Creek	good	Redick	Foot and boat survey
1971 8/05	165	Mouth to canyon and Deception Creek	normal		Foot and boat survey
1972 7/28	370	Mouth to canyon and Deception Creek	excellent	Watsjold	Foot and boat survey
1973 7/24	678	Mouth to canyon	excellent	Watsjold	Super cub
1973 7/25	771	Mouth to canyon	excellent	Watsjold	
1973 7/25	1,019	Mouth to canyon and Deception Creek	excellent	Kolb	Foot and boat survey
1974 7/26	402	Mouth to canyon and Deception Creek	excellent	Watsjold	Foot and boat survey
1975 8/04	177	Mouth to canyon and Deception Creek	excellent	Watsjold	Foot and boat survey
1976 7/15	1,747	Mouth to canyon and Deception Creek	excellent		Foot and boat survey
1977 7/20	1,065	Mouth to canyon and Deception Creek	excellent		Foot and boat survey
1978 7/26	1,263	Mouth to canyon and Deception Creek	normal		Foot and boat survey
1979 7/26	1,085	Mouth to canyon and Deception Creek	fair		Foot and boat survey
1980	nc				no count
1981 7/29	1,357	Mouth to canyon and Deception Creek	excellent	Engel	
1982 8/06	821	Mouth to canyon and Deception Creek	excellent	Sweet	Foot and boat survey
1983 6/28	1,191	Mouth to canyon	normal	Engel	much too early for escapement count
1983 7/19	898	Mouth to canyon and Deception Creek	excellent	Havens	Foot and boat survey
1984 6/27	700	Mouth to canyon	excellent	Bentz	much too early for escapement count
1984 7/31	3,464	Mouth to canyon and Deception Creek	excellent	Bentz	
1985 8/01	2,900	Mouth to canyon and Deception Creek	normal	Bentz	
1986 7/15	2,580	Mouth to canyon and Deception Creek	normal	Hepler	
1987 7/21	3,460	Mouth to canyon and Deception Creek	good	Rutz	
1988	3,286	Mouth to canyon and Deception Creek			Hepler et al. 1989
1989 7/18	5,860	Mouth to canyon and Deception Creek			Sweet & Webster 1990

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**Appendix B2.-Page 17 of 21.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Willow Creek and Deception Creek - Continued</u></b>					
1990 7/20	3,065	Mouth to canyon and Deception Creek	excellent	Sweet	
1991 7/23	2,753	Mouth to canyon and Deception Creek	excellent		
1992 7/24	2,643	Mouth to canyon and Deception Creek	excellent	Bartlett	
1993 7/20	3,448	Mouth to canyon and Deception Creek	normal	Whitmore	
1994 7/20	2,114	Mouth to canyon and Deception Creek	normal	Sweet	Low count during 1994
1994 7/29	2,245	Mouth to canyon and Deception Creek	excellent	Sweet	Largest count during 1994
1995 7/21	4,626	Mouth to canyon and Deception Creek	excellent	Sweet	
1996 7/19	2,987	Mouth to canyon and Deception Creek	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Indian River</u></b>					
1972 7/30	35	Mouth to the forks	excellent	Watsjold	Super cub
1973 7/26	110	Mouth to upper rapids	excellent	Engel	Super cub
1973 7/29	122	Mouth to upper rapids	excellent	Watsjold	Helicopter
1974 7/25	102	Mouth to upper rapids	excellent	Watsjold	Super cub
1975 8/04	31	Mouth to upper rapids	excellent	Engel	Super cub
1976 7/23	537	Mouth to upper rapids	excellent	Engel	Super cub
1977 7/19	393	Mouth to upper rapids	excellent	Engel	Super cub
1978 7/25	114	Mouth to upper rapids	excellent	Havens	Super cub
1979 7/26	285	Mouth to upper rapids	excellent	Havens	Super cub
1980	nc				no count
1981 7/27	422	Mouth to upper rapids	good	Delaney	Su Hydro ADF&G 1981
1982 7/21	1,053	Mouth to upper rapids	excellent		Su Hydro ADF&G 1983a
1983 7/25	1,193	Mouth to upper rapids	excellent		Barrett et al. 1984
1984 7/25	1,456	Mouth to upper rapids	good		Barrett et al. 1985
1987	1,246	assume same index area			Hepler et al. 1988
1988	456	assume same index area			Hepler et al. 1989
1989 7/29	660	Mouth to upper rapids	normal	Sweet	
1990 7/16	1,473	Mouth to upper rapids	good	Sweet	
1991 7/24	1,468	Mouth to upper rapids	excellent	Sweet	
1992 7/25	479	Mouth to upper rapids	normal	Sweet	
1993 7/24	362	Mouth to upper rapids	normal	Sweet	Past peak spawning late count
1994 7/27	336	Mouth to upper rapids	excellent	Sweet	Outstanding counting conditions
1995 7/27	796	Mouth to upper rapids	excellent	Sweet	
1996 7/23	579	Mouth to upper rapids	normal	Bartlett	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>North Fork of the Kashwitna River</u></b>					
1961 7/25	35			ADF&G	Super cub
1962 7/31	19			ADF&G	Super cub
1963 7/07	3			ADF&G	Super cub
1964 7/17	14			ADF&G	Super cub
1965 7/11	3			ADF&G	Super cub
1969 7/16	0			Stewart	Comm Fish survey Supercub
1971 8/04	1	Mouth to headwaters	excellent	Watsjold	Super cub
1972 8/01	31	Mouth to headwaters	excellent	Watsjold	Super cub
1973 7/30	183	Mouth to headwaters	excellent	Watsjold	Super cub
1973 7/25	145	Mouth to headwaters	excellent	Engel	Helicopter
1974 7/26	103	Mouth to headwaters	excellent	Engel	Super cub
1974 7/31	85	Mouth to headwaters	poor	Watsjold	Helicopter
1975 7/28	33	Mouth to headwaters	normal	Watsjold	
1976 7/23	303	Mouth to headwaters	normal	Watsjold	
1977 7/19	336	Mouth to headwaters	excellent	Watsjold	
1978	234	Mouth to headwaters		Engel	
1979 7/26	457	Mouth to headwaters	excellent	Watsjold	
1981 7/31	558	Mouth to headwaters	excellent	Engel	
1982 8/10	156	Mouth to headwaters	good	Barrett	
1983 7/18	297	Mouth to headwaters	normal	Bentz	
1984 7/31	111	Mouth to headwaters	poor	Sweet	
1985 8/01	457	Mouth to headwaters	poor	Bentz	
1986 7/17	700	Mouth to headwaters	excellent	Hepler	

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**Appendix B2.-Page 20 of 21.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>North Fork of the Kashwitna River - Continued</u></b>					
1987	872	Mouth to headwaters		Rutz	Hepler et al. 1988
1988	1,159	Mouth to headwaters			Hepler et al. 1989
1989 7/18	355	Mouth to headwaters	normal	Bartlett	
1991 7/25	340	Mouth to headwaters	excellent	Bartlett	
1992 7/19	470	Mouth to headwaters	excellent	Sweet	
1993 7/21	525	Mouth to headwaters	normal	Lafferty	
1994 7/22	430	Mouth to headwaters	excellent	Sweet	
1995 7/22	836	Mouth to headwaters	good	Lafferty	
1996 7/18	782	Mouth to headwaters	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Portage Creek</u></b>					
1962 7/30	27	Mouth to the upper forks			Kubik 1963
1963 8/15	0	Mouth to the upper forks			Kubik 1964
1972 7/30	68	Mouth to the upper forks	excellent	Engel	Super cub
1973 7/26	153	Mouth to the upper forks	excellent	Engel	Super cub
1973 7/29	174	Mouth to the upper forks	excellent	Watsjold	Helicopter
1974 7/27	260	Mouth to the upper forks	excellent	Watsjold	Super cub
1975 8/04	32	Mouth to the upper forks	excellent	Engel	Super cub
1976 7/23	702	Mouth to the upper forks	excellent	Engel	Super cub
1977 7/19	374	Mouth to the upper forks	excellent	Watsjold	Super cub
1978 7/25	140	Mouth to the upper forks	excellent	Havens	Super cub
1979 7/26	190	Mouth to the upper forks	excellent	Havens	Super cub
1980	nc				no count
1981 7/27	659	Mouth to the upper forks			Bentz 1983
1982	1,111	Mouth to the upper forks			Bentz 1983
1983 7/25	3,140	Mouth to the upper forks			Bentz 1984
1984	2,341	Mouth to the upper forks			Hepler and Bentz 1985
1987	2,616	Mouth to the upper forks			Hepler et al. 1988
1988	1,402	Mouth to the upper forks			Hepler et al. 1989
1989 7/29	1,309	Mouth to the upper forks	normal	Sweet	
1990 7/17	1,886	Mouth to the upper forks			
1991 7/24	1,223	Mouth to the upper forks	excellent	Sweet	
1992 7/25	1,078	Mouth to the upper forks	excellent	Sweet	
1993 7/24	629	Mouth to the upper forks	normal	Sweet	
1994 7/27	857	Mouth to the upper forks	excellent	Sweet	
1995 7/27	1,505	Mouth to the upper forks	excellent	Sweet	
1996 7/23	2,185	Mouth to the upper forks	normal	Bartlett	

<sup>a</sup> Bentz 1983 and 1984 reports three segments, but Hepler and Bentz 1985 and 1986 do not report all three segments.

<sup>b</sup> 1984, 1985, and 1987 estimates are solely from Fishery Data Series reports. There is no information in the stream files or memos from Hepler to Delaney from westside surveys.



**Appendix B3.-Historical escapement index counts of chinook salmon into miscellaneous streams of the Eastside Susitna Management Unit, 1958-1996.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
Talkeenta Drainage					
Disappointment Creek					
1958 8/01	5	Mouth to the falls			Kubik 1964
1962 7/19	0	Mouth to the falls			Kubik 1964
1973 8/3	20	Mouth to the falls	poor	Watsjold	Difficult to survey in super cub
Chulitna Drainage					
Troublesome Creek					
1958 7/07	100	Ground survey			Kubik 1964
1971 7/27	5				Watsjold 1972
1972 7/30	5				Watsjold 1973
1973 7/26	7				Watsjold 1974
1974 7/25	14				Watsjold 1975
1976 7/23	95				Watsjold 1977
1978	192				Watsjold 1979
1979	58				Watsjold 1980
1982 8/12	36				ADF&G 1982
Tokositna River					
1958 7/25	0				Kubik 1964
Alder Creek					
1958 7/22	0				Kubik 1964
1963 8/19	0				Kubik 1964

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Appendix B3.-Page 2 of 8.

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Chulitna Drainage - continued</b>					
<b><u>Bunco Creek</u></b>					
1973 8/02	34	Ground and aerial survey			Watsjold 1974
1976 7/23	112				Watsjold 1977
1977	136				Watsjold 1978
1978	153				Watsjold 1979
1982 8/07	198				ADF&G 1983a
1983	523				Barrett et al. 1984
1984 8/10	51				Barrett et al. 1985
<b><u>Spink Creek</u></b>					
1958 7/07	60				Kubik 1964
1963 8/19	0				Kubik 1964
1982 8/07	0				ADF&G 1983a
<b><u>Byers Creek</u></b>					
1964 8/27	2				Kubik 1965
1965 8/06	4				Kubik 1966
1971	2				ADF&G 1982
1972 7/30	7				Watsjold 1973
1973 7/26	1				Watsjold 1974
1974 7/25	0				Watsjold 1975
1976 7/23	53				Watsjold 1977
1977	69				Watsjold 1978
1979	28				Watsjold 1980
1982	15				ADF&G 1983a
<b><u>Coal Creek</u></b>					
1962 7/30	5				Kubik 1963
1963 8/19	0				Kubik 1964

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Chulitna Drainage - continued</b>					
<b><u>Pass Creek</u></b>					
1962 7/30	15				Kubik 1963
1963 8/19	0				Kubik 1964
1973	8				Watsjold 1974
<b><u>Honolulu Creek</u></b>					
1973 7/26	17				Watsjold 1974
1974 7/25	12				Watsjold 1975
1976 7/23	24				Watsjold 1977
1977	36				Watsjold 1978
1978	13				Watsjold 1979
1979	37				Watsjold 1980
1982 8/12	27				ADF&G 1983c
<b>Susitna Drainage</b>					
<b><u>Kashwitna River</u></b>					
1961 7/25	35				Stefanich 1962
<b><u>Rabideux Creek</u></b>					
1964 8/05	8				Kubik 1965
1977	99				Kubik & Wadman 1978
1984 7/23	8				Barrett et al. 1985
<b><u>Sunshine Creek</u></b>					
1961 7/25	0				
1984 8/03	1	Ground Survey			Barrett et al. 1985

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Upper Susitna Drainage</b>					
<b><u>Question Creek</u></b>					
1961 7/25	0				Kubik 1964
<b><u>Birch Creek</u></b>					
1984 8/09	16	Ground Survey			Barrett et al. 1985
<b><u>Trapper Creek</u></b>					
1984 7/23	15	Ground Survey			Barrett et al. 1985
<b><u>Cache Creek</u></b>					
1984 8/01	0	Ground Survey			Barrett et al. 1985
<b><u>Whiskers Creek</u></b>					
1975 8/04	22	Ground Survey			Friese 1975
1981 8/05	0	Ground Survey			ADF&G 1981
1982 8/08	0	Ground Survey			ADF&G 1983b
1983 8/04	3	Ground Survey			Barrett et al. 1984
1984 7/22	67	Aerial Survey - helicopter			Barrett et al. 1985
<b><u>Chase Creek</u></b>					
1982 8/11	15	Ground Survey			ADF&G 1983b
1983 8/01	0	Ground Survey			Barrett et al. 1984
1984 8/16	3	Ground Survey			Barrett et al. 1985

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Upper Susitna Drainage - continued</b>					
<b><u>Slash Creek</u></b>					
1983 8/15	0	Ground Survey			Barrett et al. 1984
1984 8/14	0	Ground Survey			Barrett et al. 1985
<b><u>Gash Creek</u></b>					
1982 8/07	0	Ground Survey			ADF&G 1983b
1983 8/05	0	Ground Survey			Barrett et al. 1984
1984 8/07	0	Ground Survey			Barrett et al. 1985
<b><u>Lane Creek</u></b>					
1958 7/17	5				Kubik 1964
1962 7/19	0				Kubik 1964
1981 7/28	40				ADF&G 1981
1982 7/28	47	Ground Survey			ADF&G 1983b
1983 8/02	12	Ground Survey			Barrett et al. 1984
1984 7/22	23				Barrett et al. 1985
<b><u>Clyde Creek</u></b>					
1984 8/07	0	Ground Survey			Barrett et al. 1985
<b><u>Maggot Creek</u></b>					
1984 8/14	0	Ground Survey			Barrett et al. 1985

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Upper Susitna Drainage - continued</b>					
<b><u>Lower McKenzie Creek</u></b>					
1981 8/23	0	Ground Survey			ADF&G 1981
1982 8/13	0	Ground Survey			ADF&G 1983b
1983 8/15	0	Ground Survey			Barrett et al. 1984
1984 8/07	0	Ground Survey			Barrett et al. 1985
<b><u>McKenzie Creek</u></b>					
1962 7/19	0				Kubik 1964
1981 8/11	0	Ground Survey			ADF&G 1981
1982 8/13	0	Ground Survey			ADF&G 1983b
1983 8/15	0	Ground Survey			Barrett et al. 1984
1984 8/14	0	Ground Survey			Barrett et al. 1985
<b><u>Little Portage Creek</u></b>					
1982 8/13	0	Ground Survey			ADF&G 1983b
1983 8/15	0	Ground Survey			Barrett et al. 1984
1984 8/07	0	Ground Survey			Barrett et al. 1985
<b><u>Deadhorse Creek</u></b>					
1962 7/19	0				Kubik 1964
1981 8/11	0	Ground Survey			ADF&G 1981
1983 8/15	0	Ground Survey			Barrett et al. 1984
1984 8/13	0	Ground Survey			Barrett et al. 1985

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Upper Susitna Drainage - continued</b>					
<b><u>Fifth of July Creek</u></b>					
1981 8/11	0	Ground Survey			ADF&G 1981
1982 8/06	3	Ground Survey			ADF&G 1983b
1983 8/05	0	Ground Survey			Barrett et al. 1984
1984 7/23	17	Ground Survey			Barrett et al. 1985
<b><u>Skull Creek</u></b>					
1981 8/19	0	Ground Survey			ADF&G 1981
1982 8/12	0	Ground Survey			ADF&G 1983b
1983 8/13	0	Ground Survey			Barrett et al. 1984
1984 8/06	0	Ground Survey			Barrett et al. 1985
<b><u>Sherman Creek</u></b>					
1981 8/11	0	Ground Survey			ADF&G 1981
1982 8/06	3	Ground Survey			ADF&G 1983b
1983 8/14	0	Ground Survey			Barrett et al. 1984
1984 8/06	0	Ground Survey			Barrett et al. 1985
<b><u>Fourth of July Creek</u></b>					
1974 8/16	0	Aerial, Ground, & Boat Survey			Barrett 1974
1975 8/17	0	Ground Survey			Friese 1975
1981 8/10	0	Ground Survey			ADF&G 1981
1982 8/15	5	Ground Survey			ADF&G 1983b
1983 8/05	6	Ground Survey			Barrett et al. 1984
1984 7/22	92	Aerial Survey			Barrett et al. 1985

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Upper Susitna Drainage - continued</b>					
<b><u>Gold Creek</u></b>					
1982 8/03	21	Ground Survey			ADF&G 1983b
1983 7/24	23	Aerial Survey			Barrett et al. 1984
1984 8/01	23	Aerial Survey			Barrett et al. 1985
<b><u>Jack Long Creek</u></b>					
1981 8/21	0	Ground Survey			ADF&G 1981
1982 8/11	2				ADF&G 1983b
1983 7/24	0	Aerial Survey			Barrett et al. 1984
1984 7/21	7	Aerial Survey			Barrett et al. 1985
<b><u>Cheechako Creek</u></b>					
1962 7/19	0	Aerial Survey - Super cub			Kubik 1964
1982 8/06	16	Aerial Survey - Helicopter			ADF&G 1983b
1983 8/01	25	Aerial Survey - Helicopter			Barrett et al. 1984
1984 8/01	29	Aerial Survey - Helicopter			Barrett et al. 1985
<b><u>Chinook Creek</u></b>					
1982 8/06	5	Aerial Survey - Helicopter			ADF&G 1983b
1983 8/01	8	Aerial Survey - Helicopter			Barrett et al. 1984
1984 8/01	15	Aerial Survey - Helicopter			Barrett et al. 1985
<b><u>Devil Creek</u></b>					
1982 8/06	0	Aerial Survey - Helicopter			ADF&G 1983b
1983 8/02	1	Aerial Survey - Helicopter			Barrett et al. 1984
1984 8/11	0	Aerial Survey - Helicopter			Barrett et al. 1985
<b><u>Fog Creek</u></b>					
1984 7/21	2	Aerial Survey - Helicopter			Barrett et al. 1985



**Appendix B4.-Historical escapement index counts of chinook salmon into major streams of the Westside Susitna Management Unit, 1958-1996.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Alexander Creek</b>					
1961 7/11	0	Mainstem including all tribs		Kubik	Kubik 1964 super cub
1962 7/23	19	Mainstem including all tribs		Kubik	Kubik 1964 super cub
1963 8/16	750	Mainstem including all tribs		Kubik	Kubik 1964 super cub
1964 7/29	205	Mainstem and Sucker Creek		Kubik	Kubik 1965 Boat Survey
1965 7/30	416	Mainstem and Sucker Creek		Kubik	Kubik 1966 Boat Survey
1966	300	Mainstem including all tribs		Kubik	Kubik 1967 super cub
1967	500	Mainstem including all tribs		Kubik	Kubik 1968 super cub
1968	727	Mainstem including all tribs		Kubik	Kubik 1969 super cub
1969	735	Mainstem including all tribs		Kubik	Kubik 1970 super cub
1970	562	Mainstem including all tribs		Kubik	Kubik 1971 super cub
1971	nc				
1972	202	Mainstem including all tribs		Kubik	Kubik 1973 super cub & foot survey
1973	875	Mainstem including all tribs		Kubik	Kubik & Trent 1974 super cub
1974	2,193	Mainstem including all tribs		Kubik	Kubik & Chlupach 1975 super cub
1975	1,878	Mainstem including all tribs		Kubik	Kubik & Riis 1976 super cub
1976	5,412	Mainstem including all tribs		Kubik	Kubik & Wadman 1977 super cub
1977	9,246	Mainstem including all tribs		Kubik	Kubik & Wadman 1978 see introduction
1978	5,854	Mainstem including all tribs		Kubik	Kubik & Wadman 1979 super cub
1979 8/02	6,215	Mainstem including all tribs		Delaney	Kubik & Delaney 1980
1980	nc				
1981	nc		poor		
1982	2,546	Mainstem including all tribs			Delaney & Hepler 1983
1983 7/19	3,755	Mainstem including all tribs			Su Hydro Rpt. Barrett et al. 1984
1984 7/20	4,620	Mainstem including all tribs			Su Hydro Rpt. Barrett et al. 1985

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**Appendix B4.-Page 2 of 10.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Alexander Creek - continued</u></b>					
1985 7/24	6,241	Mainstem including all tribs	normal	Hepler	Hepler & Bentz 1986
1986 7/14	5,225	Mainstem including all tribs	normal	Hepler	Hepler & Bentz 1987
1987	2,152	Mainstem including all tribs			Hepler et al. 1988
1988	6,273	Mainstem including all tribs			Hepler et al. 1989
1989 7/27	3,497	Mainstem including all tribs	normal	Rutz	
1990 7/12	2,596	Mainstem including all tribs	normal	Rutz	
1991 7/24	2,727	Mainstem including all tribs	excellent	Rutz	
1992 7/19	3,720	Mainstem including all tribs	normal	Rutz	
1993 7/19	2,007	Mainstem including all tribs	normal	V-Lang	
1993 7/27	2,763	Mainstem including all tribs	normal	Sweet	
1994 7/20	1,103	Mainstem including all tribs	normal	Rutz	
1994 7/29	1,514	Mainstem including all tribs	normal	Hepler	
1995 7/17	1,017	Mainstem including all tribs	normal	Lafferty	low count - large schools of fish - too early
1995 7/26	2,090	Mainstem including all tribs	excellent	Sweet	
1996 7/21	2,319	Mainstem including all tribs	normal	Lafferty	two large schools at Sucker Ck
1996 7/26	2,130	Mainstem including all tribs	normal	Whitmore	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Deshka River</u></b>					
1958 5/29	3				Kubik 1964
1962	19	ground survey			Stefanich 1962
1962 8/8-11	998	ground survey			Kubik 1963
1963 7/03	131				Kubik 1964 aerial survey
1964	2,422	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik 1965 boat survey
1965	2,749	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik 1966 aerial survey
1966	933	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik 1967 aerial survey
1967	1,535	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik 1968 aerial survey
1968	4,863	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik 1969 aerial survey
1969	5,652	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik 1970 aerial survey
1970	5,286	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik 1971 aerial survey
1971	161	East Fork only (Moose Ck?)			Kubik 1972 aerial survey
1972	1,780	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik 1973 aerial survey
1973	2,381				Kubik and Trent 1974 tower count
1974	5,279	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik and Chlupach 1975 aerial survey
1975	4,737	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik and Riis 1976
1976	21,693	Entire system (Chujik, Trapper, W. fork, Moose)			Kubik and Wadman 1977 aerial survey
1977	39,642	Entire system (Chujik, Trapper, W. fork, Moose)	excellent	Kubik	Kubik and Wadman 1978 helicopter survey
1978	24,639	Entire system (Chujik, Trapper, W. fork, Moose)	normal	Kubik	Kubik and Wadman 1979 aerial survey
1979	27,385	Entire system (Chujik, Trapper, W. fork, Moose)	excellent	Delaney	Kubik and Delaney 1980
1980	nc	high water & turbidity	poor	Delaney	Delaney helicopter survey notes
1981	nc	high water & turbidity	poor	Delaney	Delaney helicopter survey notes
1982	16,000	Entire system (Chujik, Trapper, W. fork, Moose)	average	Hepler	Delaney and Hepler 1983
1983	19,237	Entire system (Chujik, Trapper, W. fork, Moose)			Barrett et al. 1984
1984	16,892	Entire system (Chujik, Trapper, W. fork, Moose)	average	Hepler	Hepler and Bentz 1985

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Appendix B4.-Page 4 of 10.

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Deshka River - continued</u></b>					
1985 8/04	18,151	Entire system(Chujik, Trapper, W. fork, Moose)	good	Hepler	Hepler and Bentz 1986
1986 7/18	21,080	Entire system(Chujik, Trapper, W. fork, Moose)	excellent	Rutz	Hepler and Bentz 1987
1987 7/27	15,028	Entire system(Chujik, Trapper, W. fork, Moose)	normal	Rutz	Hepler et al. 1988
1988	19,200	Entire system(Chujik, Trapper, W. fork, Moose)			Hepler et al. 1989
1989	nc				Sweet and Webster 1990
1990	18,166	Entire system(Chujik, Trapper, W. fork, Moose)			Sweet et al. 1991
1991	8,112	Entire system(Chujik, Trapper, W. fork, Moose)	fair		
1992	7,736	Entire system(Chujik, Trapper, W. fork, Moose)			
1993 7/22-2	5,670	Entire system(Chujik, Trapper, W. fork, Moose)	normal	Whitmore	
1993 7/28	5,769	Entire system(Chujik, Trapper, W. fork, Moose)	excellent	Sweet	AMR Whitmore et al. 1994
1994 7/20-2	2,153	Entire system(Chujik, Trapper, W. fork, Moose)	normal	Lafferty	
1994 7/27-2	2,665	Entire system(Chujik, Trapper, W. fork, Moose)	normal	Whitmore	AMR Whitmore et al. 1995
1995 7/19-2	4,156	Entire system(Chujik, Trapper, W. fork, Moose)	normal	Lafferty	weir count 10,048
1996 7/24-2	6,343	Entire system(Chujik, Trapper, W. fork, Moose)	normal	Schwarz	weir count 14,354

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Lake Creek</u></b>					
1961 2/9	60				Kubik 1964 aerial survey
1962 7/12	10				Kubik 1963 aerial survey
1963 2/7	4				Kubik 1964 aerial survey
1964	45	Mainstem only			Kubik 1965 aerial survey
1965	172	Mainstem only			Kubik 1966 aerial survey
1966	300	Entire system			Kubik 1967 aerial survey
1967	1,000	Entire system			Kubik 1968 aerial survey
1968	1,300	Entire system			Kubik 1969 aerial survey
1969	1,540	Entire system			Kubik 1970 aerial survey
1970	54	Mainstem	very poor		Kubik 1971 aerial survey
1971	119	Mainstem and Sunflower & Camp creeks			Kubik 1972 aerial survey
1972	920	Entire system			Kubik 1973 aerial survey
1973	761				Kubik & Trent 1974 aerial & ground survey
1974	535				Kubik & Chlupach 1975 aerial survey
1975	281				Kubik & Riis 1976 aerial survey
1976 7/26	3,735				Kubik & Wadman 1977 aerial survey
1977	7,391				Kubik & Wadman 1978 aerial survey
1978	8,931				Kubik & Wadman 1979 aerial survey
1979	4,196				Kubik & Delaney 1980 aerial survey
1980	1,026	only Camp & Sunflower creeks	very poor	Delaney	
1981 7/30	169		very poor		
1982	3,577	Entire system	fair	Delaney	
1983 7/26	7,075	Entire system	excellent	Hepler	
1984	nc			Hepler	incomplete count

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**Appendix B4.-Page 6 of 10.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Lake Creek - continued</u></b>					
1985 8/4-5	5,803	Entire system	fair	Hepler	
1986	nc				Hepler & Bentz 1987
1987	4,898	Entire system			Hepler et al. 1988
1988	6,633	Entire system			Hepler et al. 1989
1989	nc				Sweet & Webster 1990
1990	2,075	Entire system	normal	Hepler	
1991 7/22	3,011	Entire system			
1992 7/23	2,322	Entire system	normal	Sweet	
1993 7/22	2,869	Entire system	normal	Sweet	
1994 7/29	1,898	Entire system	normal	Lafferty	
1995 7/18-19	3,017	Entire system	normal	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Talachulitna Creek</u></b>					
1958 6/25	0				Kubik 1964 aerial survey
1961 6/29	32				Stefanich 1962 aerial survey
1962 7/27	78				Kubik 1963 aerial survey
1963 7/29	56				Kubik 1964 aerial survey
1964 1/4	95				Kubik 1965 aerial survey
1965 8/07	69				Kubik 1966 aerial survey
1966	15				Kubik 1967 aerial survey
1972	405				Kubik 1973 aerial survey
1973	333	Tower count			Barrett 1973
1974	55				Barrett 1975 helicopter survey
1975	120				Kubik & Riis 1976 aerial survey
1976	1,319	Mainstem, Thurs, Fri, Saturday & Tal creeks			Kubik & Wadman 1977 aerial survey
1977	1,856	Mainstem, Thurs, Fri, Saturday & Tal creeks			Kubik & Wadman 1978 aerial survey
1978	1,375	Mainstem, Thurs, Fri, Saturday & Tal creeks			Kubik & Wadman 1979 aerial survey
1979	1,648	Mainstem, Thurs, Fri, Saturday & Tal creeks			Kubik & Delaney 1980 aerial survey
1980	nc	Mainstem, Thurs, Fri, Saturday & Tal creeks			Delaney survey notes
1981	2,025	Mainstem, Thurs, Fri, Saturday & Tal creeks			Hepler & Kubik 1982
1982	3,101	Mainstem, Thurs, Fri, Saturday & Tal creeks		Delaney	Bentz 1984
1983 7/29	10,014	Mainstem, Thurs, Fri, Saturday & Tal creeks	good	Hepler	Bentz 1984
1984 7/31	6,138	Mainstem, Thurs, Fri, Saturday & Tal creeks	good	Hepler	Hepler & Bentz 1985

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**Appendix B4.-Page 8 of 10.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Talachulitna Creek - continued</u></b>					
1985	5,145	Mainstem, Thurs, Fri, Saturday & Tal creeks	excellent	Hepler	Hepler & Bentz 1986
1986	3,686	Mainstem, Thurs, Fri, Saturday & Tal creeks			Hepler & Bentz 1987
1987	nc				Hepler et al. 1988
1988	4,112	Mainstem, Thurs, Fri, Saturday & Tal creeks			Hepler et al. 1989
1989	nc				Sweet & Webster 1990
1990 7/13	2,694	Mainstem, Thurs, Fri, Saturday & Tal creeks	normal	Bartlett	
1991 7/25-26	2,457	Mainstem, Thurs, Fri, Saturday & Tal creeks		Bartlett	
1992 7/22	3,648	Mainstem, Thurs, Fri, Saturday & Tal creeks		Rutz	
1993 7/21-22	3,269	Mainstem, Thurs, Fri, Saturday & Tal creeks	excellent	Sweet	
1994 7/27-28	1,575	Mainstem, Thurs, Fri, Saturday & Tal creeks	normal	Lafferty	
1995 7/17-18	2,521	Mainstem, Thurs, Fri, Saturday & Tal creeks	normal	Sweet	
1996 7/24	2,748	Mainstem, Thurs, Fri, Saturday & Tal creeks	normal	Lafferty	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Peters Creek</u></b>					
1962 8/14	9			Kubik	Kubik 1964
1963 7/09	5	Martin Creek only		Kubik	Kubik 1964
1964 7/29	12	Martin Creek only			
1965 7/27	101			Kubik	Kubik 1966
1972	95			Kubik	Kubik 1973
1974	147	Mouth to headwaters, including Martin Creek		Kubik	Kubik & Chlupach 1975
1975	13	Mouth to headwaters, including Martin Creek		Kubik	Kubik & Riis 1976
1976	3,071	Mouth to headwaters, including Martin Creek		Kubik	Kubik & Wadman 1977
1977	5,163	Mouth to headwaters, including Martin Creek		Kubik	Kubik & Wadman 1978
1978	1,540	Mouth to headwaters, including Martin Creek		Kubik	Kubik & Wadman 1979
1979 8/07	108	Martin Creek only	normal	Delaney	Kubik & Delaney 1980
1980	nc				
1981	nc				
1982	4,000	Mouth to headwaters, including Martin Creek		Kubik	ADF&G 1982
1983 7/14	2,272	Mouth to headwaters, including Martin Creek			Barrett et al. 1984
1984	324	Mouth to headwaters, including Martin Creek			Hepler & Bentz 1985

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Peters Creek - continued</u></b>					
1985	2,901	Mouth to headwaters, including Martin Creek			Hepler & Bentz 1986
1986	1,915	Mouth to headwaters, including Martin Creek			Hepler & Bentz 1987
1987	1,302	Mouth to headwaters, including Martin Creek			Hepler et al. 1988
1988	3,927	Mouth to headwaters, including Martin Creek			Hepler et al. 1989
1989 7/29	959	Mouth to headwaters, including Martin Creek			Sweet & Webster 1990
1990 7/16	2,027	Mouth to headwaters, including Martin Creek			
1991 7/25	2,458	Mouth to headwaters, including Martin Creek	fair	Bartlett	
1992 7/21	996	Mouth to headwaters, including Martin Creek	fair	Sweet	
1993 7/21	1,668	Mouth to headwaters, including Martin Creek	normal	Rutz	
1994 7/26	573	Mouth to headwaters, including Martin Creek	normal	Rutz	
1995 7/18	1,041	Mouth to headwaters, including Martin Creek	normal	Rutz	
1996 7/20	749	Mouth to headwaters, including Martin Creek	normal	Sweet	

**Appendix B5.-Historical escapement index counts of chinook salmon into miscellaneous streams of the Westside Susitna Management Unit, 1958-1996.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Cache Creek</b>					
1958 7/23	0	Mouth to headwaters			Kubik 1964
1962 7/23	4	Mouth to headwaters			Kubik 1963
1976	61	Mouth to headwaters			Kubik & Wadman 1977
1977 7/25	100	Mouth to headwaters	poor	Kubik	Kubik & Wadman 1978
1983	497	Mouth to headwaters			Hepler & Bentz 1984
1985 7/30	216	Mouth to headwaters	poor		
1987 7/29	556		normal	Rutz	turbid below slide area
1990 7/16	484	Mouth to headwaters			
1991 7/23	499	Mouth to headwaters			
1992 7/22	487	Mouth to headwaters	poor	Sweet	turbid below slide area
1993 7/21	1,690	Mouth to headwaters		Rutz	
1994 7/29	628	Mouth to headwaters	poor	Rutz	turbid below slide area
1995 7/18	1,601	Mouth to headwaters		Rutz	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Bear Creek</u></b>					
1962 7/23	9	Mouth to headwaters			Kubik 1963
1963 8/09	13	Mouth to headwaters			Kubik 1964
1964 7/29	4	Mouth to headwaters			Kubik 1965
1972	12	Mouth to headwaters			Kubik 1973
1976	15	Mouth to headwaters			Kubik & Wadman 1977
1977	298	Mouth to headwaters			Kubik & Wadman 1978
1982	100	Mouth to headwaters			ADF&G 1982
<b><u>Canyon Creek</u></b>					
1962 7/27	23	Mouth to headwaters			Kubik 1963
1963 7/13	0				Kubik 1964
1972	8				Kubik 1973
1973	29				Kubik & Trent 1974
1974	10				Kubik & Chlupach 1975
1975	2				Kubik & Riis 1976
1976	44				Kubik & Wadman 1977
1977 8/02	135				Kubik & Wadman 1978
1981 7/29	84				ADF&G 1981
1982	nc				no count
1983 7/13	575				Barrett et al. 1984

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Red Creek</u></b>					
1958 7/21	27				Kubik 1964
1962 7/27	11				Kubik 1963
1977 7/22	1,511				Kubik & Wadman 1978
1978	385				Kubik & Wadman 1979
1981 7/29	749				ADF&G 1981
1994 7/28	451	Mouth to headwaters	normal	Lafferty	
1995 7/18	408	Mouth to headwaters	good	Sweet	
1996 7/20	548	Mouth to headwaters	normal	Sweet	
<b><u>Donkey Creek</u></b>					
1963 7/06	0	Mouth to headwaters			Kubik 1964
1973	25	Mouth to headwaters			Kubik & Trent 1974
1977 7/28	159	Mouth to headwaters			Kubik & Wadman 1978
1978	163	Mouth to headwaters			Kubik & Wadman 1979
1982	100	Mouth to headwaters			ADF&G 1982
1990 7/12	363	Mouth to headwaters	normal	Bartlett	
1991 7/26	161	Mouth to headwaters	normal		

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Yenta Drainage Miscellaneous Streams</b>					
<b><u>Whitsol Creek</u></b>					
1984 8/09	0	ground survey			Barrett et al. 1985
<b><u>Fish Creek</u></b>					
1963 8/14	0				Kubik 1964
1977	132				Kubik & Wadman 1978
<b><u>Moose Creek</u></b>					
1965	26				Kubik 1966
<b><u>Pickle Creek</u></b>					
1982	100				ADF&G 1982
<b><u>Hungryman Creek</u></b>					
1982	100				ADF&G 1982
<b><u>Granite Creek</u></b>					
1973	4				Watsjold 1974
<b><u>Fish Lake Creek</u></b>					
1965 7/30	53				Kubik 1966
1977	131				Kubik & Wadman 1978
1978	66				Kubik & Wadman 1979
1983 7/22	250				ADF&G 1982c

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Yenta Drainage Miscellaneous Streams - Continued</b>					
<b><u>Eightmile Creek</u></b>					
1961 7/17	0	ground survey			Kubik 1964
1962 7/04	2	ground survey			Kubik 1963
1994 7/28	104	Mouth to headwaters helicopter	good	Lafferty	
<b><u>Quartz Creek</u></b>					
1976 8/17	0				ADF&G 1982
1977 8/02	8				Kubik & Wadman 1978
1979 8/26	5	very late count			ADF&G 1982
1981 7/29	8				ADF&G 1981
<b><u>Contact Creek</u></b>					
1982	100				ADF&G 1982
<b><u>Dickason Creek</u></b>					
1977	4				Kubik & Wadman 1978
<b><u>Squaw Creek</u></b>					
1973	10				Kubik & Trent 1974
<b><u>Hewitt Creek</u></b>					
1962 8/02	0				Kubik 1964
1973 8/18	0				Barrett 1973
1983 7/22	0				ADF&G 1982c

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Yenta Drainage Miscellaneous Streams - Continued</b>					
<b><u>Huckleberry Creek</u></b>					
1972 8/23	1				Barrett et al. 1973
1975 8/29	328	Date is highly suspicious to KS spawning			Friese 1976
1978 8/29	311	Date is highly suspicious to KS spawning			ADF&G 1982
1979 8/26	500	Date is highly suspicious to KS spawning			ADF&G 1982
1980 8/22	1,000	Date is highly suspicious to KS spawning			ADF&G 1982
<b><u>Johnson Creek</u></b>					
1958 7/21	0				Kubik 1964
1962 7/27	0				Kubik 1964
1963 7/03	0				Kubik 1964
<b><u>Kichatna River</u></b>					
1963 7/03	0				Kubik 1964
1977	120				ADF&G 1982
1982	1,000				ADF&G 1982
<b><u>Nakochna River</u></b>					
1973	12				Kubik & Trent 1974
1974	2				Kubik & Chlupach 1975
1982	100				ADF&G 1982
<b><u>Clearwater Creek</u></b>					
1962 7/27	13				Kubik 1963
1963 7/06	0				Kubik 1964
1973	6				Kubik & Trent 1974
1977 8/03	47		excellent	Kubik	Kubik & Wadman 1978
1982	100				ADF&G 1982



**Appendix B6.-Historical escapement index counts of chinook salmon into major streams of the West Cook Inlet Management Unit, 1958-1996.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Chuitna River</u></b>					
1973	149	Mouth to headwaters			
1974	171	Mouth to headwaters			
1975 7/11	629	Mouth to headwaters	poor	Kubik	
1976	1,984	Mouth to headwaters			
1977 7/19	1,891	Mouth to headwaters	poor	Kubik	
1978	1,130	Mouth to headwaters			
1979	1,246	Mouth to headwaters	excellent	Kubik	
1980	nc				
1981	1,362	Mouth to headwaters			
1982	3,438	Mouth to headwaters			
1983	4,043	Mouth to headwaters			
1984	2,845	Mouth to headwaters			
1985 7/25	1,600	Mouth to headwaters	excellent	Bowden	
1986 7/14	3,946	Mouth to headwaters	excellent	Delaney	
1987	nc				
1988	3,024	Mouth to headwaters			
1989 7/26	990	Mouth to headwaters			
1990 7/11	480	Mouth to headwaters			
1991 7/21	537	Mouth to headwaters	excellent	Engel	
1992 7/20	1,337	Mouth to headwaters	excellent	Rutz	
1993 7/19	2,085	Mouth to headwaters	excellent	Sweet	
1994 7/28	1,012	Mouth to headwaters	normal	Rutz	
1995 7/15	1,162	Mouth to headwaters	normal	Sweet	
1995 7/27	1,109	Mouth to headwaters	normal	Lafferty	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Lewis River</u></b>					
1976	380	Mouth to headwaters			Bentz 1984
1977 7/26	454	Mouth to headwaters	normal	Kubik	Bentz 1984
1978	561	Mouth to headwaters			Bentz 1984
1979 7/23	546	Mouth to headwaters		Delaney	Bentz 1984
1980	nc				Bentz 1984
1981	560	Mouth to headwaters			Bentz 1984
1982	606	Mouth to headwaters			Bentz 1984
1983	nc				Bentz 1984
1984	947	Mouth to headwaters			Helper & Bentz 1985
1985 7/19	861	Mouth to headwaters	excellent	Delaney	Helper & Bentz 1986
1986 7/14	722	Mouth to headwaters	excellent	Delaney	Helper & Bentz 1987
1987	875	Mouth to headwaters			Helper et al. 1988
1988	616	Mouth to headwaters			Helper et al. 1989
1989 7/26	452	Mouth to headwaters	normal		Sweet & Webster 1990
1990 7/11	182	Mouth to headwaters			
1991 7/21	303	Mouth to headwaters	excellent		
1992 7/19	445	Mouth to headwaters		Rutz	
1993 7/20	531	Mouth to headwaters	excellent	Sweet	
1994 7/22	164	Mouth to headwaters	poor	Rutz	
1995 7/16	146	Mouth to headwaters	excellent	Sweet	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b>Theodore River</b>					
1976	1,032	Mouth to headwaters			Bentz 1984
1977 7/26	2,263	Mouth to headwaters		Kubik	Bentz 1984
1978	547	Mouth to headwaters			Bentz 1984
1979 7/23	512	Mouth to headwaters	excellent	Delaney	Bentz 1984
1980	nc				Bentz 1984
1981	535	Mouth to headwaters			Bentz 1984
1982	1,368	Mouth to headwaters			Bentz 1984
1983	1,519	Mouth to headwaters			Bentz 1984
1984	1,251	Mouth to headwaters			Hepler & Bentz 1985
1985 7/19	1,458	Mouth to headwaters			Hepler & Bentz 1986
1986 7/14	1,281	Mouth to headwaters	excellent	Delaney	Hepler & Bentz 1987
1987	1,548	Mouth to headwaters			Hepler et al. 1988
1988	1,906	Mouth to headwaters			Hepler et al. 1989
1989 7/26	1,026		normal		Sweet & Webster 1990
1990 7/11	341	Partial count			
1990	642	Mouth to headwaters			Sweet et al. 1991
1991 7/21	508	Mouth to headwaters	excellent		
1992 7/19	1,053	Mouth to headwaters	normal	Rutz	
1993 7/20	1,110	Mouth to headwaters	normal	Sweet	
1994 7/22	577	Mouth to headwaters	excellent	Lafferty	
1995 7/16	363	Mouth to headwaters	normal	Sweet	several large schools - low count
1995 7/27	694	Mouth to headwaters	normal	Lafferty	
1996 7/17	368	Mouth to headwaters	normal	Lafferty	
1996 7/25	361	Mouth to headwaters	normal	Sweet	

**Appendix B7.-Historical escapement index counts of chinook salmon into miscellaneous streams of the West Cook Inlet Management Unit, 1958-1996.**

Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Olsen Creek</u></b>					
1976	247	Mouth to headwaters			Bentz 1984
1977 7/26	1,229	Mouth to headwaters	normal	Kubik	
1978	94	Mouth to headwaters			Bentz 1984
1979 8/6	17	Mouth to headwaters	excellent	Kubik	
1981	116	Mouth to headwaters			Bentz 1984
1982	188	Mouth to headwaters			Bentz 1984
1983	nc				no count
1985 7/31	192	Mouth to headwaters	excellent	Hepler	Survey Memo Hepler (9/26/85) <sup>a</sup>
1986 7/14	165	Mouth to headwaters	good	Delaney	Hepler & Bentz 1987
1987	nc				Hepler et al. 1988
1994 7/22	59	Mouth to headwaters	normal	Rutz	
<b><u>Coal Creek</u></b>					
1978	1,551				Survey Memo Delaney (8/18/80) <sup>a</sup>
1979 8/06	178	Mouth to headwaters including W. Fork	poor	Kubik	
1985 8/03	823	Mouth to headwaters including W. Fork	normal	Hepler	
1994 7/28	309	Mouth to headwaters including W. Fork	normal	Rutz	
1995 7/18	221	Mouth to headwaters including W. Fork	normal	Sweet	
1996 7/18	424	Mouth to headwaters including W. Fork	normal	Lafferty	
<b><u>Drill Creek</u></b>					
1976	11				Survey Memo Delaney (8/25/82) <sup>a</sup>
1978	77				Survey Memo Delaney (8/25/82)
1979 8/06	11	Mouth to headwaters	poor	Kubik	
1982	697				Survey Memo Delaney (8/25/82)
1985 7/31	337	Mouth to headwaters	excellent	Hepler	

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Year/Date	Count	Index Area	Conditions	Observer	Comments
<b><u>Bishop Creek</u></b>					
1977 7/19	468	Mouth to headwaters		Kubik	
1979 8/06	30	Mouth to headwaters	excellent	Kubik	"just no fish"
1985 7/31	203	Mouth to headwaters	excellent	Hepler	
<b><u>Straight Creek</u></b>					
1976	59	Mouth to headwaters			Survey Memo Delaney (8/25/82)
1977 7/19	24	Mouth to headwaters			
1978	108	Mouth to headwaters			Survey Memo Delaney (8/25/82)
1981	126	Mouth to headwaters			Survey Memo Delaney (8/25/82)
1982	388	Mouth to headwaters			Survey Memo Delaney (8/25/82)
<b><u>Nikolai Creek</u></b>					
1976	11				Survey Memo Delaney (8/25/82)
1977 7/19	143	Less than 25% of stream surveyed		Kubik	
1981	26				Survey Memo Delaney (8/25/82)
1982	520				Survey Memo Delaney (8/25/82)
1993 7/26	156	Mouth to headwaters	normal	Sweet	
<b><u>Scarp Creek</u></b>					
1982	184				Survey Memo Delaney (8/25/82)
1985 7/31	145	Mouth to headwaters	excellent	Hepler	

<sup>a</sup> Survey memos located in stream files located at Palmer office of ADF&G.